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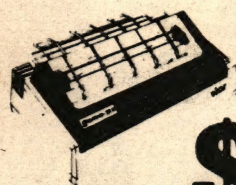
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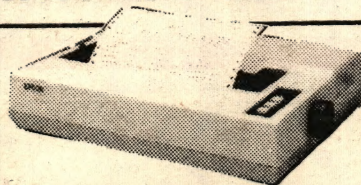
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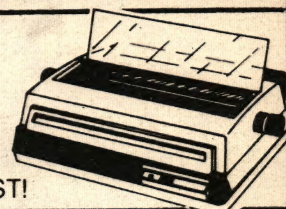
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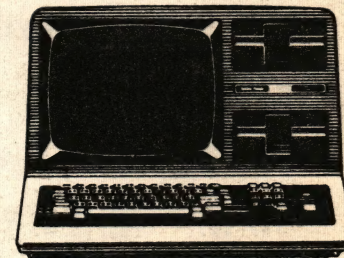
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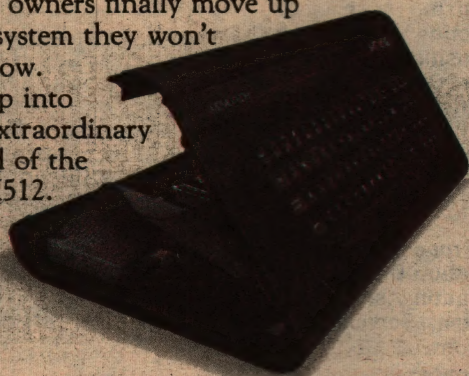
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Portable Panasonic Sr. Partner Features IBM-Compatibility And Built-In Printer

Panasonic Industrial Co. has launched its thrust into the U.S. business market with a new transportable 16-bit computer called The Senior Partner also designated the Model RL-H7000. This new computer features the MSDOS 2.0 Operating System, IBM-PC hardware compatibility and is equipped with a built-in dot matrix, thermal printer.

The Sr. Partner was designed specifically for the American market and is being sold with a package of six popular programs valued at \$1,500. The complete price for the system with one double-density, double-side disk drive storing 360 kbytes; a 9-inch monochrome (green) CRT and 128k of RAM is \$2,495.

A second drive is available for \$450 and there are slots for two additional IBM-type boards. One of the additional slots is for memory expansion. Panasonic will provide an optional expansion memory board that has 128K of memory chips and blank sockets for 256K of additional Ram. This provides a total of 512 Kbytes of RAM for the computer. The other slot can be used for additional I/O, communications board, or any other purpose this slot has provision for I/O connectors on the rear panel. With an eye to the future, Panasonic has also provided a socket for an 8087 Co-processor. There is also provision for the addition of an expansion chassis which will be manufactured in the near future.

Unlike the IBM PC, the Sr. Partner comes with both RS-232C Serial and Centronics-type Parallel I/O ports built-in, with connectors mounted on the rear panel.

The IBM PC requires a video adapter card for either monochrome or color video, however the Sr. Partner provides both types of video display as standard. The 9-inch monochrome CRT is built into the portable chassis and there is a connector for the addition of a RGB Color Monitor. The built-in CRT has a green display of 80 characters by 25 lines, or 40 characters by 25 lines. This display has an extremely high resolution. We have seldom seen characters or graphics on a video screen that were as sharp as those on the Sr. Partner. It is what one would expect from Panasonic, but it is nice to see that they have not degraded their video reputation for the low price of

this computer.

There is one additional feature that is seldom found on a portable computer of this type and that is the built-in thermal printer. It prints both 80 or 132 characters per 8 1/2-inch line, or very high-resolution graphics. The printer is mounted in the top of the case making it very easy to see the output and to load rolls of paper. The paper will be supplied by the manufacturer through his dealers at a cost of \$4.50 per roll.

The keyboard is mounted in the case cover and is IBM PC compatible except that there is a CTRL/PT SC key sequence to shift the printer output from the built-in printer to a standard Centronics printer port. This enables the use of a impact dot matrix, or daisy wheel printer in place of the built-in thermal unit. The printer feature assures that when the computer is used in its portable mode, the printer is not left at home.

After reading the specifications of the Sr. Partner we wanted to see for ourselves how this Japanese computer compared with other IBM clone portables such as the Compaq, Hyperion, Chamelion. We called Panasonic and requested a review machine. They said that they were not ready to send computers to magazines, but we could visit their offices in New Jersey and arrange to spend a day with it. We accepted the offer and were given the opportunity to use the computer and to speak with a computer product development engineer about its design and construction.

The Panasonic company has transferred the responsibility for this computer to their Industrial Company whereas previous personal computers have been under the Home Information Systems, Consumer Electronics Group. This is a sign that the Sr. Partner is intended for business and industry in the United States and will receive the support that this division of Matsushita Electric Corporation of America is well known for.

We have always considered the Hyperion Computer to be the outstanding example of MSDOS portable computer design, with the Compaq in second place. We also have never been strong on built-in printers having seen them in the Dot Computer, the ACCESS Computer and the BMC Computer.



Portable Panasonic Sr. Partner

With these pre-conceived notions in mind we visited Panasonic to see the Sr. Partner and we must admit that this machine completely changed our mind.

The Sr. Partner is housed in an attractive case which at first appearance looks like plastic, closer inspection reveals that it is metal with a hard plastic-like finish. The front panel unlatches and folds over. It houses the keyboard assembly. There are retractable feet to permit a comfortable typing angle and the keyboard coiled cable is retracted into a compartment in the front. When extended, the cable is plugged into the keyboard. We liked this arrangement, many portables of this type have the keyboard cable connected at the rear of the computer, thus making 3/4 of the cable useless for keyboard extension.

The arrangement of the keys is the "standard" IBM PC design, but the shift and return keys are somewhat wider. The "feel" of the keys is excellent, and we liked the keyboard very much. The only negative reaction was that we wish that they had put a LED in the CAP Lock and NUM Lock keys.

The Sr. Partner weighs in at 28.7 lbs, which makes it a "transportable" rather than a portable in our opinion, but when you carry it from place to place, you are moving a complete computer system rather than just a computer.

The software package included VisiCalc, Wordstar,

PFS File, PFS Graph, PFS Report and GW BASIC, a most useful collection of software and one that would preclude a user from having to spend any money on software for a long time. In addition, programs like Microsoft's Flight Simulator also worked very well on the computer. Panasonic is compiling a list of compatible software packages that it will supply to its dealers for use by their customers. While no MSDOS computer can be completely "IBM PC compatible" this one must be rated as one of the most compatible.

We did not see the documentation for the computer since it was still in work, but we were told that Panasonic fully intended to make it complete, easy to read and easy to use. When we asked about service support for the end user, we were told that this was to be done by the dealers. Panasonic says, "We have a complete service and maintenance program to train our dealers and we will support them fully". One of the reasons that the Sr. Partner was transferred to the Panasonic Industrial Company was to provide this support.

We used the built-in printer in both the text and graphics modes and we were surprised at the quality of the printing. The paper produces a black image rather than the blue produced by some non-impact printers and it is readable. While we would not consider

the output to be correspondence quality, it is fine for at least 50% of the hard copy output we need. Since we have a portable computer and miss having a printer in the field, we think that this will be a popular feature. It is not intended to take the place of a office printer.

Panasonic says that they will have this computer in a nationwide network of dealers this spring and that they will support its sale with national advertising. The public trusts their name and we believe that the Sr. Partner will be very well received. While there is nothing radical about this computer, we believe that it offers a lot for a reasonable price. It should firmly establish Panasonic as a contender in the personal computer field. Matsushita made some errors in marketing their HHC through two divisions and by trying to introduce the JR2000 cassette based computer into the American market at a time when only disk based machines were selling. This time it appears that they are giving the Sr. Partner the same attention that they give their major electronic products and this time they should gain some market share. The Sr. Partner may merit the slogan of Panasonic "Just slightly ahead of our time", meaning the Japanese computer market. It is not ahead of the American personal computer industry being

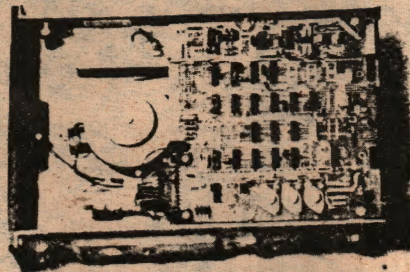
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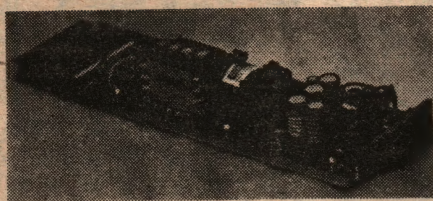
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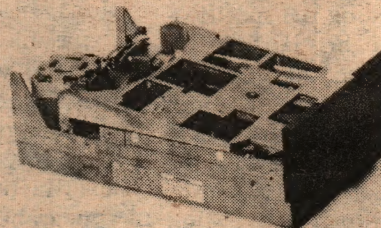
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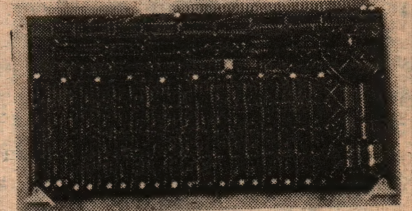
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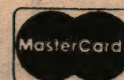
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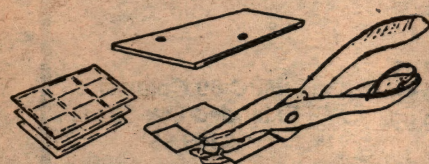
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Portable Panasonic Continued from page 5

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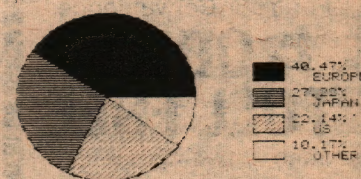
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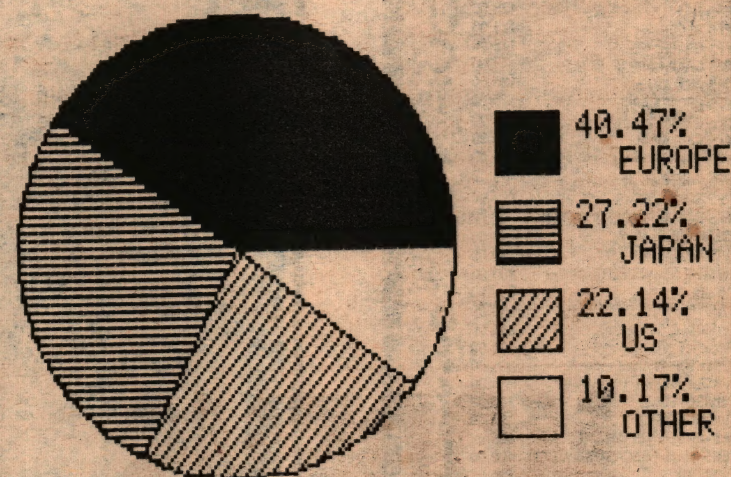
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Editorial

BY STAN VEIT

This month, according to my editorial calendar, the theme article was supposed to be 'The Impact of The New Computers'. When I made this calendar months ago, I reasoned that everybody would be interested in a story about how the new machines such as the IBM PCjr, Macintosh, Tandy 2000, Coleco's Adam, Timex's 2068 and other new machines were effecting the personal computer market.

I was not wrong, everyone would be interested in such an article, but I don't think it can be written at this time by anyone except a seer. It is too soon to tell.

There are almost no IBM PCjrs in the hands of users, Apple is delivering a few Macintosh computers to commercial users. Tandy is delivering some Model 2000's and Timex is selling the 2068 by mail order. I went to a local computer show a few weeks ago where they had lots of Adam Computer Systems in big boxes. They were selling them for \$650 with a free video monitor; but there were few takers!

So what *is* selling? We did a little survey in New York and Florida and found that the stores were selling all the IBM PC's and XT's that they could get. Where they could not get IBM machines they were selling IBM clones like Compaq, Columbia, Eagle, Corona. The stores report that there is acceptance of these machines as long as they run the applications software that the customer needs. Word Process-

ing, Spreadsheet and Data Base programs were the most popular.

TI Professional Computers were reported to be selling well and DEC Rainbows were being accepted by the public. From these reports it would appear to be an MSDOS world.

However upon closer questioning you find out that Kaypro was still very strong with new computer owners and so was the Morrow Micro Decision. This indicates that CP/M-80 is far from dead, the huge amount of lower cost, proven software will keep it alive for many years.

What amazed us is the fact that Apple dealers are having one of their best years, selling Apple IIe and even the Apple III. This in spite of the introduction of Macintosh and the lower priced, revised Lisa.

The popularity of Apple IIe also seems to include the Franklin and all the Apple clones advertised in this magazine! People are not dumb, they are well aware of all the advantages of all the software and hardware existing for Apple II and its clones.

Last but not least is the Commodore phenomenon. Have you any idea how many 64's they are selling? They don't talk and no one else knows, but it's HUGE. Everyone who has ever thought of buying a computer seems to have just bought a Commodore 64.

Apple thinks that all of the 25 million 'knowledge workers' will buy Macintosh. I think that this will only be true if the boss pays the bill. As for the employees, they have already bought Commodore 64's for themselves and their kids.

My wife is a teacher and we know lots of teachers. They have all taken those scare ads about their kids to heart. They, more than anyone else believe that their kids must be computer literate to do well in their future schooling. Most of them use Apple II's in their schools, but they can't afford them at home, so they bought the close-out TI 99/4A's and they are now buying Commodore 64's.

Speaking of TI 99/4A, look in our classified columns, do you see a lot of these obsolete computers for sale? No way! Those that have them are keeping them. If you can find a new one on the market it brings over \$150.00! I have never seen such product loyal-

ty as Texas Instrument users exhibit! Where was it when TI needed it? Well it was there but TI's stupid marketing did everything they could to suppress it. Talk about snatching defeat from the jaws of victory, TI was #1.

By the way, our Club and User Group Listings are provided as a free service. So are the BBS listings.

We want to do everything we can to promote user groups and we try very hard to keep the listings accurate. It is not an easy job because names and addresses change and people do not tell us about it on time to make our deadlines.

Sometimes we print a wrong number for a BBS. Have you ever had your phone ringing all night because it is listed as a BBS? We try to print the correct numbers, so try and make them clear when you send them in. Thanks.

We have also had our editorial people harassed by

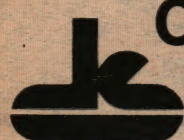
unreasonable people, because of an error in a listing. Please don't do that or we will have to stop this service. We are only human and we do try hard to please you.

THE WEST COAST COMPUTER FAIRE

It is Spring again and the season for Computer Shows is upon us! This issue will come out in time for the West Coast Computer Faire, that famous gathering of the computer clan in San Francisco. We will be there and we would like to have you visit our Booth 1807C in Brooks Hall. All year we editorialize about all the things that we think you should know about, but we need feedback from you in order to produce a publication that you will enjoy and find useful. We have some exciting things coming up for you in the next few months and we would like to discuss some of our plans with our readers. See ya'll in San Francisco.

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Two additions to its family of software offerings, including a new implementation of the UNIX(tm) System V operating system has been announced by Charles River Data Systems.

UNOS is compatible with AT&T's UNIX, but because it is designed for real time and run time applications, it is more compact and executes more rapidly than UNIX,

which was designed for program development.

The other announcement was Revision 4 of UNOS, which adds terminal handling features, expanded process/memory device control facilities, and automatic bootstrapping to the proprietary operating system.

The new implementation, called UN/System V, enables Charles River Data Systems' OEM customers to write their application software using the full set of UNIX development tools. The application software then can run under UNOS, saving the end user the cost of UNIX licenses. UNOS licenses cost substantially less than UNIX license, a saving that an OEM can pass on to customers.

In addition to its reliability and performance features, UN/System V features record and file locking, which prevents users from accessing a file when someone else is modifying it.

To increase performance, UN/System V includes:

- Interprocess synchronization, which allows a system to wait for multiple events and maintain a history of them, so they cannot be lost.

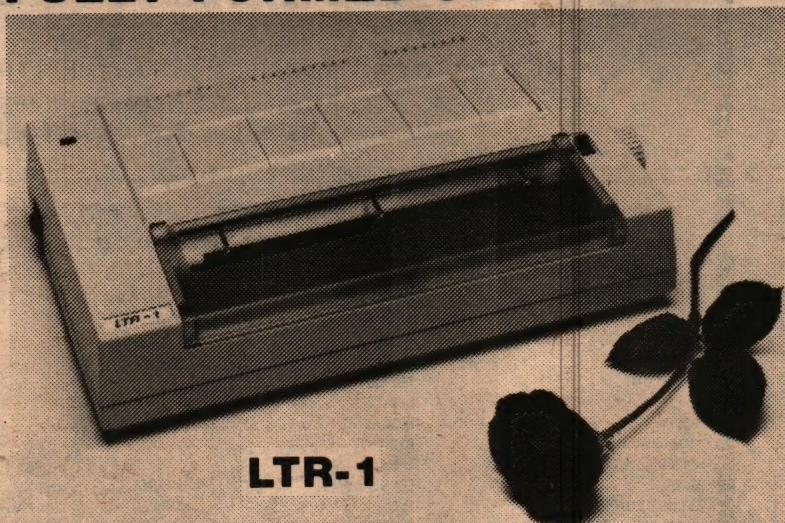
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Enhanced Version of Unix Continued from page 10

- Shared data facilities, which allow two processes to communicate at the highest speed possible by letting them share a memory area,
- Priority scheduling, which allows a user to process tasks in the priority re-

quired to meet performance goals, and

- Real time-oriented device driver interfaces, which allow device drivers to execute as the result of a system event.

Enhanced Reliability-

Three features of UN/System V are not available on UNIX System V enhance system

reliability. The features are:

- Bit map file allocation, which prevents duplicate entries from being made, and reduces disk access time by locating files as close together as possible.
- Exception processing control by user tasks, which lets subroutines identify and handle unexpected events, and

- The ability to automatically map around a bad section on a Winchester disks.

The UN/System V operating system is priced at \$4,000, which includes the software and a UNIX System V license. Deliveries will begin in March.

UN/System V will prove to be as reliable as UNOS. For example, the file environment in

UN/System V is the same as that of UNOS, which has not lost a file since it was first installed in 1981.

UN/System V is an extended implementation of UNIX Systems V. That's why a license for UNIX System V is included when someone buys UN/System V. It has been pointed out that UN/System V complies with the standards proposed by the /usr/group Standards Committee, of which Charles River Data Systems is a member.

The two operating systems run on Charles River Data Systems' Universe 68 family of computers. The family's combination of a high speed 32 bit microprocessor and a 32 bit data path combines the performance of super minicomputer systems with the price and reliability of systems based on microcomputers.

UNOS REV Adds Features

The new UNOS capabilities are contained in Revision 4 of the UNOS operating system. The new revision is available immediately.

The revision gives Universe 68 systems the ability to accept asynchronous block transfers of data from intelligent terminals or other input devices at rates up to 19.2K bits per second. Transferring blocks of data at high speeds gives users at terminals a fast response time.

In addition, UNOS Revision 4 has increased its ability to support a large number of character-oriented terminals, increasing system throughput. This is especially important in character oriented applications such as text and word processing and forms data entry.

The new release also provides shared data and direct access to physical devices such as bit map displays or array processors. Both permit OEMs and system integrators to write effective multi-tasking applications and to control sophisticated devices that maximize the efficiency of the system for a specific application.

The automatic bootstrap lets a user start a Universe 68 system quickly and easily. On powerup, UNOS automatically configures the system, identifies the peripheral devices on the system and initializes the drivers for them, and enters the initial program, for example, an application program or the multiuser environment. In the event of an inadvertent system shutdown, a recovery sequence allows applications programs to restore the environment that existed before the shutdown.

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Software And Peripheral RoundUp For Macintosh

Apple Computer Company has arranged for the broadest range of third party support for the new Macintosh computer. In the last issue we described the computer and the software that Apple has developed for its use. Here we list some of the third party software and peripherals being developed for the Macintosh Computer.

The **Techmar Peripheral Expansion Unit** provides 4 additional RS-232 serial ports for the connection of serial peripheral devices. This unit has its own power supply and Macintosh compatible cabinet. It plugs into the Macintosh, Applebus(tm). Techmar also has produced a **Telephone/Modem Interface** for Macintosh. It can be used as a standard telephone and modem interface. It connects to the computer through an RS-232 serial port and transmits both voice and digital data.

The **Techmar 5Mbyte Cartridge Winchester** extends the mass data storage of the Macintosh by adding 5Mbyte removable Winchester cartridges. The Techmar unit uses the Syquest drive units and combines the large storage of the Winchester drive with the convenience of removable media.

The **Techmar Printer Buffer** is another member of the Macintosh peripheral family. It plugs into the Macintosh printer port between the computer and the printer and provides print buffering from 64K to 512K of all printer output. It operates essentially transparent to the Macintosh computer.

Another company providing communications for the Macintosh is **ARTSCI** who is making the **Magic Telephone**. This peripheral works with the data base program **Magic File** to provide a list of numbers for automatic dialing. It hangs on the side of the computer for the user's convenience and features a "hold" button and speak output. The **Magic Phone** will also support multiple telephone lines.

Microsoft To Fully Support Macintosh.

Bill Gates, chairman of Microsoft Corporation, believes, "The Apple Macintosh, together with Microsoft software, represents a major

change in how people are going to view and interact with computer programs. The Macintosh is a blend of Apple's knowledge of what personal computing should be, what the semiconductor industry has made possible, and Microsoft's ability to create software that enables users to get the most out of the computer. Microsoft has worked with Apple to ensure that both Microsoft programs and the Macintosh itself are able to meet the needs of users."

Macintosh Environment Adds Functionality To Productivity Tools

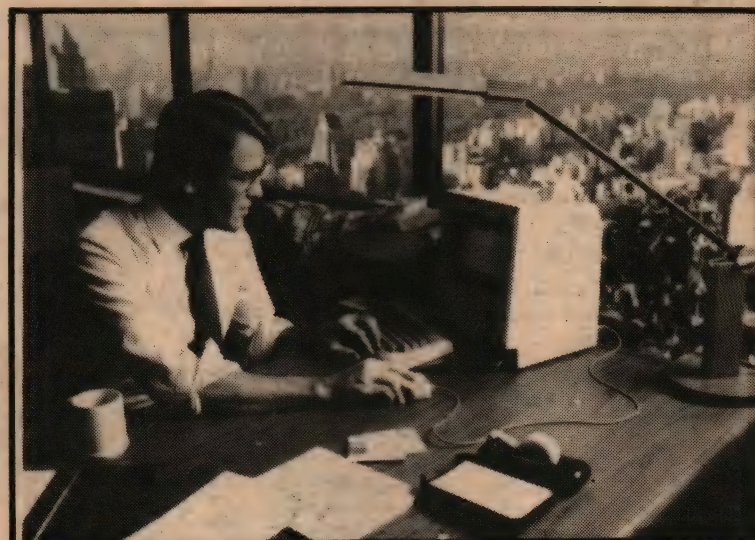
Macintosh's unique interface together with the Microsoft programs, provides a powerful and functional environment for increasing a user's productivity. The very high resolution graphics screen enables graphics to be applied universally to all modes, whether they be charts and graphs as in Microsoft Chart, columns of figures in Multiplan, or words, sentences, and paragraphs in Microsoft Word. Thus, users can readily combine text with graphics without the usual intermixing problems.

Microsoft Multiplan on the Macintosh provides all the features of other versions of Multiplan, with additional enhancements. An "Undo" command allows reversal of the last change to the spreadsheet. Recalculation is faster on the Macintosh, and "smarter"-recalculation will pause so the user experiences no delay while working. Enhancements to printing reports include headers and footers, and automatic page numbering.

In addition, Multiplan completely incorporates all the features of the Macintosh interface such as "pull-down"

menus and the use of the Macintosh mouse. The user can cut and paste between spreadsheets, and to Microsoft Chart for presentation quality business graphics. Multiplan is compatible with Microsoft's SYLK format, which means that it is very easy to transfer spreadsheets or data from Multiplan on other machines to the Macintosh in order to take advantage of the Multiplan enhancements for Macintosh.

Microsoft Word uses the graphics capabilities of the Macintosh to allow full vision representation of text and graphics on the screen, including proportional spacing and support for Macintosh's fonts. Word makes full use of Macintosh's menus and dialog managers. Moving and copying portions of text, including moving text between documents, is accomplished with the standard Macintosh edit functions of Cut, Copy,



and Paste. Microsoft Word also includes an extensive facility for merging information from other documents--or Microsoft File--into form letters.

Microsoft Chart on the Macintosh is a powerful business graphics program that enables graphics data to be entered, edited and formatted

directly in windows on the screen. Chart presents the user with a "gallery" of available business charts--bar, line, pie, scatter, etc.--that the user can choose to quickly visualize the chosen data. If the user wishes to make use of the full power

Continued on page 14

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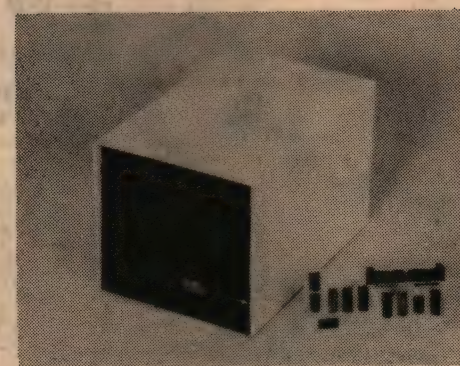
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Software & Peripheral

Continued from page 13

of Microsoft Chart, he or she can easily customize the chart by using the mouse to select formats or options, or move selected objects on the chart to

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alternate positions with the familiar click and drag operation. The user also has complete control of the font, type size, position, and other characteristics of any text (heading, axis, titles, etc.) for a given chart. High-quality business graphics can also be created with information from Microsoft Multiplan or File.

Microsoft File is a productivity tool for the storage and retrieval of data and offers

forms-based data entry and retrieval. File forms are selected from system-supplied gallery of standard data forms that can be modified by the user if desired. File can be used to supply data to any application that can read and write text files, or Macintosh's Clipboard.

Microsoft BASIC on Macintosh takes full advantage of the large direct addressing capability of the Macintosh's Motorola 68000 micro-processor, including a decimal math pack with 14-digit precision, and string variables and string expressions of up to

32,767 characters each. It is source code compatible with all standard versions of Microsoft BASIC, allowing for easy migration of program written in Microsoft BASIC to the Macintosh. Microsoft BASIC fully incorporates the Macintosh interface and presents the user with up to 3 kinds of windows—one for viewing the program listing, and one for the output of the running program. BASIC also provides many of the extended graphics capabilities of Microsoft's GW BASIC, as well as support for Macintosh's Font Manager and call access to Macintosh's Quickdraw routines.

An extensive library of software packages and peripherals is being prepared for Apple Computer's new Macintosh computer by more than 100 of the world's leading independent software and hardware vendors, Apple announced January 24, 1984.

Apple said that this is the result of developer's foreseeing a large installed base of Macin-

tosh computers as well as Apple's unprecedented commitment to third-party support. Apple anticipates that more than 500 software packages will be available for the Macintosh computer by the end of 1984.

"The participation of independent developers is an essential part of Apple's product-line strategy," said Steven P. Jobs, Apple's Chairman of the Board. "Macintosh is generating the same kind of intensive third-party development that made the Apple II so successful. We're supporting this participation by making it as easy as possible for companies to develop Macintosh software."

To encourage developer involvement, Apple has been conducting an aggressive "seeding" program over the past 12 months. More than 100 leading software companies have been provided with Macintosh computers prior to the products release, as well as comprehensive technical and marketing support from Apple. Following the Macintosh introduction, Apple will continue to vigorously support further third-party development by conducting nationwide seminars and training sessions for developers.

Highly popular programs that will be available soon in special Macintosh versions include Lotus' 1-2-3 integrated business package and Software Publishing's PFS: series of productivity tools. Microsoft Corp.'s Multiplan (electronic spreadsheet) is also available and Microsoft Chart (business graphics) and Microsoft File (data-base manager) will follow soon. Other software packages under development include business productivity programs, educational tools,

Continued on page 16

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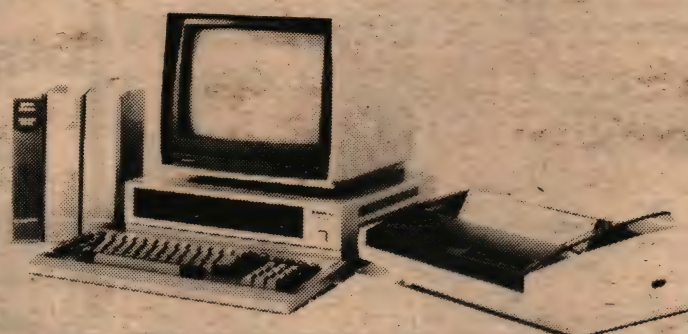
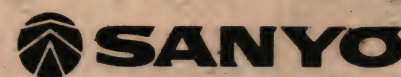
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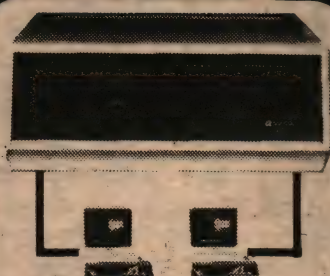
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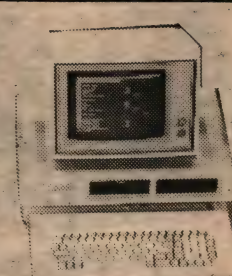


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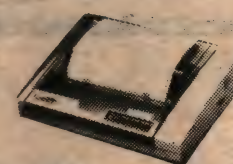
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Software & Peripheral
Continued from page 14

specialized applications (such as accounting programs), programming languages and games.

Apple itself will provide the basic Macintosh software available at launch, including MacWrite (a word-processing program) and MacPrint (a

graphics package), followed by programming languages and terminal emulation software, as well as some unique applications such as the MacProject program (for project scheduling). The majority of Macintosh software--90 percent, Apple estimates--will come from third party vendors.

Macintosh is designed so that developers can easily take advantage of the machine's sophisticated simulation of the familiar desk-top environment, which makes the machine extraordinarily simple to use. Routines common to each application, such as overlapping screen windows, pull-down menus and mouse-driven commands, are built into the system's 64 kilobytes of read-only memory (ROM). This means that developers do not have to re-create these routines for every application.

To assist software developers in their efforts, Apple is providing ongoing technical support, training classes for applications developers and comprehensive documentation called "Inside Macintosh", which includes a description of the contents of the ROM.

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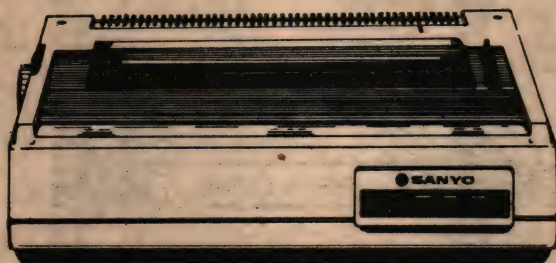
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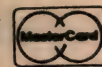
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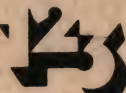
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Software & Peripheral

Continued from page 16
counts, credit cards, and other personal assets. The system will also provide extensive reports including net worth state ments, balance sheets, and budget analysis information. Personal Accounting Plus will be similar in design to its counterpart, Accounting Plus—a popular product used by managers of small to medium-sized businesses.

Personal Accounting Plus

will be released during the second quarter of 1984.

Infocom's Full Line Of Software To Be Available For Macintosh

Infocom, Inc., has announced that its best selling line of recreational software will be available for Apple's Macintosh personal computer.

Among those products are top sellers in fantasy, science fiction, murder mystery, and adventure. Macintosh owners can look forward to these in-

teractive challenges:

The ZORK(R) Trilogy - ZORK I is everybody's favorite. This classic fantasy takes you into The Great Underground Empire where you must strive to discover the 20 treasures of ZORK and escape with your life. In ZORK II, you'll encounter the Wizard of Frobozz, and in ZORK III, the final chapter, the Dungeon Master himself.

ENCHANTER(tm) and SORCERER(tm) - There's a world of magical powers and perilous predicaments to contend with ENCHANTER, the premiere of a fantasy series in the Zorkian tradition. Sorcerer, the second adventure in the ENCHANTER series has a 1,000 word vocabulary—the largest you'll find in any Infocom program.

PLANETFALL(tm), SUSPENDED(tm), and STARCROSS(tm) - In PLANETFALL, you'll try to save a doomed and plague

stricken world while trying to keep a straight face. SUSPENDED, the cryogenic nightmare on the edge of the far future, and STARCROSS, a challenging space mindbender, round out Infocom's science fiction series.

The WITNESS(tm) and DEADLINE(tm) - Personal computer enthusiasts who like a tough case to solve will be enamored with The WITNESS, a hard-boiled whodunit thriller with a 1930's theme, and DEADLINE, the first great mystery of the computer age.

INFIDEL(tm) - The original action classic in the Infocom Tales of Adventure(tm) series, INFIDEL takes you to the vast Egyptian desert where you'll struggle to find the buried entrance to the last great pyramid and seize priceless treasures.

Lotus To Market Custom Version Of 1-2-3 For Apple's Macintosh

Lotus Development Corporation today announced it will market a custom version of its 1-2-3(tm) integrated software program for Apple(tm) Computer's new Macintosh system.

The new version of 1-2-3 is designed to take advantage of Macintosh's unique features such as icons, and the cut and paste facility, which permits inter-application data exchange, according to Mitchell Kapor, President of Lotus.

"We are making a major corporate commitment to Macintosh which is natural, intuitive and in line with how people think and work. This is going to change the way people think about personal computers," Kapor said. "Macintosh sets a whole new standard, and we want our products to take advantage of this." 1-2-3 combines spreadsheets analysis, graphing, and information management functions in one fast, powerful, and easy-to-use program. The program includes a built-in, high-level language capability, called the Macro Command Language that lets users custom tailor applications and store them to run with 1-2-3.

1-2-3's Spreadsheet is the largest and most advanced developed to date, with 2,048 rows of 256 columns. Its information management function offers quick, simple entry and retrieval of more than 2,000 records, while the graphing feature enables users to create graphs from information in the spreadsheet with just a few keystrokes.

MegaHaus Readies Programs For Macintosh

MegaFinder is a data management program with report and form design capabilities. MegaFinder also includes several ready-made forms and reports which provide complete solutions for home, business, personal finance and a host of other every-day applications. This

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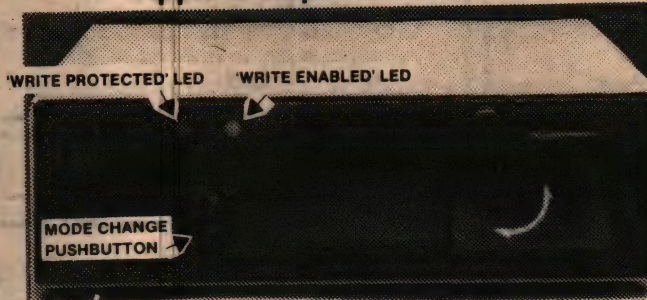
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Continued on page 22

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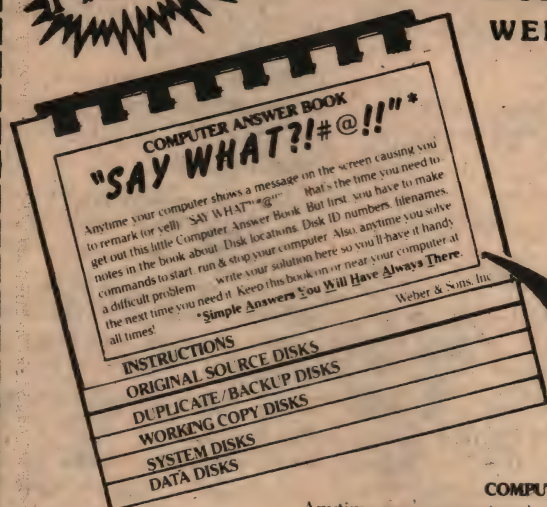
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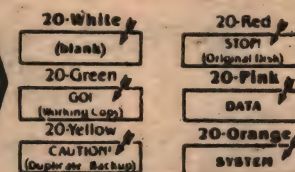
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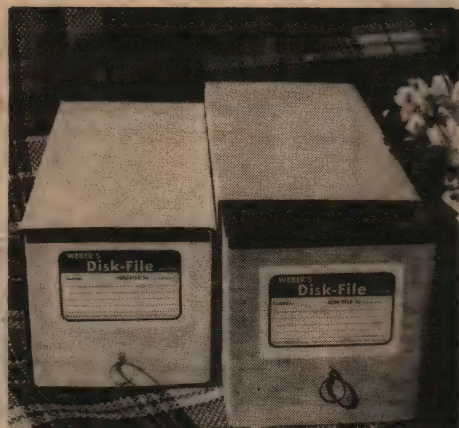
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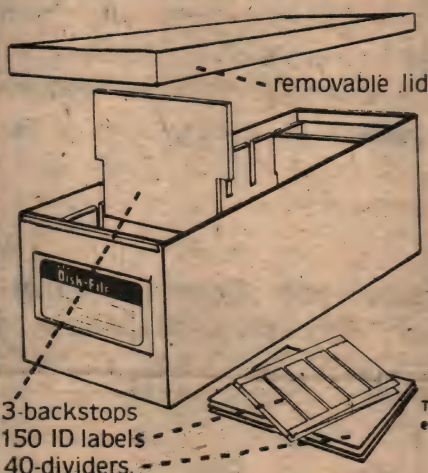
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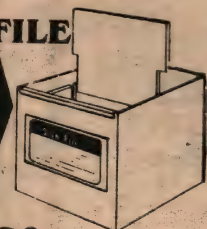
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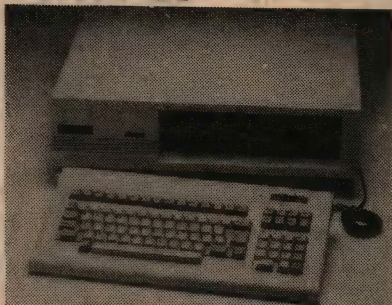
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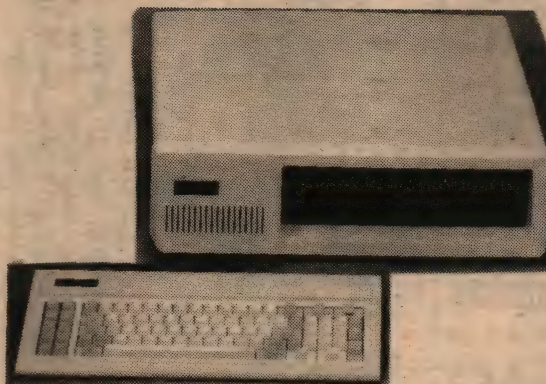
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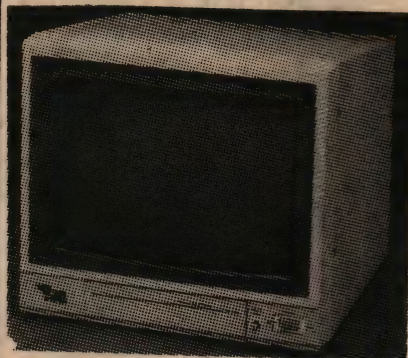
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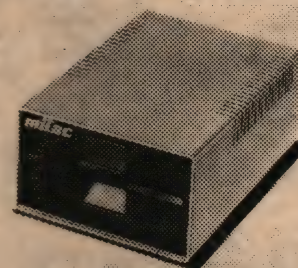
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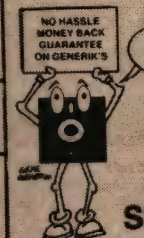
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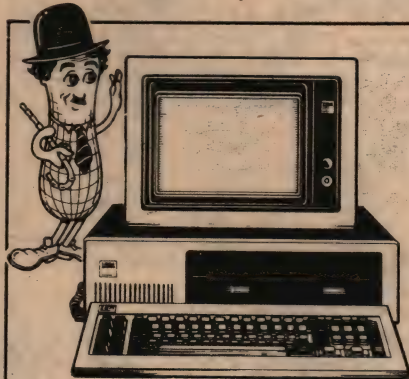
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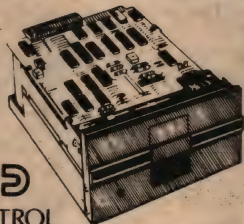
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FOX & GELLER, Quick Code	\$ 295	\$ 185
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INFOCOM, Starcross, Zork I, II or III, ea.	\$ 50	\$ 34
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Quad 512 + 512K plus serial port		\$ 895	\$ 625
Quadcolor I, board, 16 colors		\$ 295	\$ 225
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Quadchrome, 12" RGB Monitor		\$ 795	\$ 499
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Microfazer, w/copy, PP, 8K, #MP8 w/PS		\$ 189	\$ 129
Microfazer, w/copy, PP, 64K, #MP64 w/PS		\$ 319	\$ 219
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Tecmar 1st MATE, 64K	\$ 389	\$ 295
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Graflox (Color Graphics Bld)	\$ 295	\$ 195	
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SpellStar™	\$ 250	\$ 129	
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Pascal Compiler	\$ 350	\$ 250
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0536	Assembly Lines (Book)	19.95 15.35
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0042	Bag of Tricks	39.95 27.65
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0277	Battle For Normandy	39.95 27.65
0278	Beagle Bag	29.50 20.35
0126	Beagle Basic	34.95 24.20
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0111	Book of Apple Software '84	19.95 12.80
0096	Bookends	125.00 86.40
1676	BPI General Accounting	395.00 273.45
2599	Broadsides	39.95 27.70
0545	Bufferboard-Grappler	175.00 132.55
1682	Buffered Grappler+ (16K)	239.00 178.00
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2843	Global PLE/Beagle Bros	49.95 34.60
0043	Graphics Magician	59.95 41.40
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2902	Hardhat Mac	35.00 26.95
2880	Hayes Joystick Mach III	54.95 38.05
2817	Hayes Joystick Mach II	44.95 31.15
1437	Head Cleaning Kit	29.95 17.30
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2804	Home Word	69.95 46.60
1684	How To Pgrm In Applesoft	49.95 34.60
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0133	Screenwriter II	129.95 89.00
0041	Sensible Speller IV	125.00 86.50
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0465	Snooper Troops 1	44.95 31.15
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0250	Spellagraph	39.95 27.65
1291	Spellicopter	39.95 27.65
0631	Spelling Bee Games	39.95 27.70
0274	Spy's Demise	19.95 13.80
2030	SSM Transend 1	89.00 67.85
2906	Standing Stones	40.00 30.75
1277	Starwriter Film Ribbon	5.50 4.50
0435	Step-By-Step	89.95 62.30
1447	Step-By-Step II	89.95 62.30
0100	Sticky Bear A B C	39.95 27.65
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0559	Ultraterm	379.00 284.30
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2992	Verbatim DS/DD (10)	46.50 37.20
1721	Verbatim SS/DD Hardpack	35.00 27.60
0093	Verbatim SS/DD Softpack	34.00 26.95
0063	Versaform	389.00 263.00
0361	Versaform Inv. Template	49.95 34.60
0648	Videoterm W/SS & Inverse	319.00 247.05
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Don Lancaster's Tearing Into Machine Language Code - Part III

Note: HRCG - Apple's High Resolution Character Generator (Target Program)

Tearing Into Machine-Language Code by Don Lancaster excerpted from his book, *Enhancing Your Apple II*, Vols. I & II (\$17.95 each), published by Howard W. Sams & Co., Inc.

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Usually, you won't be so lucky on your first try. We now understand that this code module is the initialize portion of HRCG. We also now see what it does. We add all the above variables to our variable list, and color everything that we understand reasonably well pink for a variable or green for a constant.

Since this module is so obvious, we can also color the right tractor margin a solid wide green.

We also found out something new. All keyboard inputs go to \$8E14 and all character outputs go to \$8F18. So, label these locations in red. Do this and two more large code modules now have labels. Call these KEYBOARD ENTRY and CHARACTER OUTPUT.

Continue through the code modules and identify every variable. If you can tell exactly what the variable is used for, so much the better. If not, just put the variable on the list. The variable will most likely crop up later in another code module that may clarify its use.

Don't go overboard on

analyzing code. If something is obvious and simple, go ahead and crack the code. If it is not, just record all the variables. Do not color any variable or constant till you understand what it is used for. But, be sure to get all of them on the list.

Pay particular attention to variables inside parenthesis. A set of parenthesis means that you are doing a jump indirect or using one of the indexed indirect modes. These are among the most powerful commands the 6502 microprocessor has available, so it pays to very carefully understand how these are used. It really gets challenging when you get into the double or even the triple indirect file manipulations that are involved in the longer Adventure programs.

Don't worry too much about fuzziness and loose ends. Identify what you can and crack what code you can, but keep moving! And, every time you get a new piece of checkable information, go back and plug it in everywhere it seems to fit. The ripple effect when you do this is often astounding.

Our flag file bytes get identified as you go along. Note that \$8FA4 puts a \$20 on (861 to display the primary page and that \$8FCC puts a \$40 in \$8E61 to display the secondary page. We can then conclude that \$8E61 is the page flag. You can continue this reasoning for the other flags. The block mode ends up using the bottom half of the flag file.

You should end up with a complete list of variables, some of the code completely cracked, and lots of new hints that will help you elsewhere in your attack.

After your list is nearly complete, recopy it legibly in numeric order. Table 3 shows a list of the variables used in HRCG. Use this as an example.

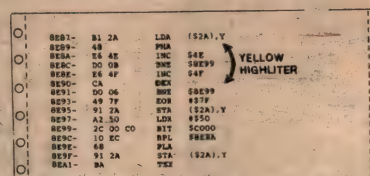
PAINT THE HOUSEKEEPING YELLOW

Next, go back through the code. Every code line that uses an implied addressing mode should be painted yellow once you understand it. Implied mode instructions use a single op code byte and are not qualified by a value or an address. Examples are INX, DEY, TXA, CLD, SEC, TSX, and so on.

If you happen to have code that uses the stack to hold a value for you, this will show up

with a PHA, some operations, and, then, a restoring PLA. Show these in yellow just like any other implied instruction. But if, and only if, the PHA and PLA are irrevocably paired as a temporary store, connect them with a yellow bracket.

Like this...



Once you understand how a yellow line is used, add comments in brown to explain it. Should you get paired PHP and PLP commands, these should also get bracketed in yellow, but only if they always work together.

What you are after here is to have a color on each and every line, a comment on each and

every line, and, on the right margin of the page, a solid green area for each module that is understood, and a solid yellow area for each stash that is cracked.

WRITE A SCRIPT

Where you are right now depends on your experience and how tough and how long the program is. If you try this method on a target program that is only a few hundred words long, you should be done by now. You should not only have met your limited goal, but should have the rest of the entire program completely cracked. On longer programs, the chances are there is lots of white space remaining. These white spaces point to uncracked code and unbroken stashes and bulk files.

The next step is to write a script. Explain in people-type words what each and every known stash, bulk file, and code module does.

A complete script of HRCG appears in Table 4. Use this as an example. If you have to leave blanks for now, do so.

CUSTOMIZE YOUR ATTACK

Hopefully, you will know what to do next at this point. Go on your own vibes in the most obvious direction.

Obviously, all machine-language programs are different. Some will involve themselves a lot with DOS. Others will use only the HIRES screens for game actions. Still others will interact with a host BASIC program, and so on.

What you now want to do is customize the attack to fit the program. How you do this is up to you. Here are some things I sometimes try...

CUSTOM ATTACK METHODS

- () Look for built-in diagnostics.
- () Use breakpoints.
- () Try flowcharting.
- () Attack indirect addressing.
- () Add hooks.
- () Gain partial control.
- () Use the cassette.
- () Single step and trace.
- () Chip away at it.
- () Attack the fundamental subs.
- () Ask for help.
- () Use partial boots.
- () Detect changes.
- () Alter files.
- () Put program on an assembler.
- () Attack a similar program.
- () Decipher special codes.
- () Try something easier.

That's sure a long list. Not every idea will work on every program, though. Let's look at a few of these in more detail.

Continued on page 30

Table 3 List of Variables for HRCG

ADDRESS	MNEMONIC	USE
— page \$00 —		
\$0020	WNDLFT	Left end of scrolling window
\$0021	WNDWDTH	Width of scrolling window
\$0022	WNDTOP	Top of scrolling window
\$0023	WNDBTM	Bottom of scrolling window
\$0024	CH	Text screen cursor horizontal
\$0025	CV	Text screen cursor vertical
\$0028	BASL	Text screen base address low
\$0029	BASH	Text screen base address high
\$002A	BAS2L	Dot row HIRES base address low
\$002B	BAS2H	Dot row HIRES base address high
\$0035	YSAV1	Temporary Y register save
\$0036	CSWL	Character output hook low
\$0037	CSWH	Character output hook high
\$0038	KSWL	Keyboard input hook low
\$0039	KSWH	Keyboard input hook high
\$004E	RNDL	Keyboard delay low
\$004F	RNDH	Keyboard delay high
\$00EB		Temporary X register save
\$00EC		HIRES base address low
\$00ED		HIRES base address high
\$00EE		Character set base address low
\$00EF		Character set base address high
\$00FF		Temporary accumulator save
— page \$01 —		
\$0104		JSR stack source pointer (X)
— page \$03 —		
\$03EA		Hook to reconnect DOS

Table 3 Cont. List of Variables for HRCG

ADDRESS	MNEMONIC	USE
— page \$8E —		
\$8E06		Default character set base low
\$8E07		Default character set base high
\$8E08		Jump to user sub A
\$8E0B		Jump to user sub B
\$8E42		Pointer to header message
\$8E5F		Escape key flag
\$8E60		Alternate character set flag
\$8E61		Primary page flag
\$8E62		Inverse video flag
\$8E63		Transparent video flag No. 1
\$8E64		Transparent video flag No. 2
\$8E65		Scrolling flag
\$8E66		Case flag
\$8E67		Character set in use base low
\$8E68		Character set in use base high
\$8E69		Save of \$8E61 while block mode
\$8E6A		Save of \$8E62 while block mode
\$8E6B		Save of \$8E63 while block mode
\$8E6C		Save of \$8E64 while block mode
\$8E6D		Save of \$8E65 while block mode
\$8E6E		Save of \$8E66 while block mode
\$8E6F		Save of \$8E67 while block mode
\$8E70		Save of \$8E68 while block mode
\$8E71		Block mode flag
\$8E72	CH	Horizontal cursor position
\$8E73	CV	Vertical cursor position
\$8F48		Function address file base low
\$8F49		Function address file base high
— page \$92 —		
\$92DF		Start of HIRES pointer file
\$92FF		Default character file start
— page \$C0 —		
\$C000	IOADR	Keyboard ASCII input
\$C010	KBDSTRB	Keyboard strobe reset
\$C052	MIXCLR	Full graphics soft switch
\$C054	LOWSCR	Page 1 soft switch
\$C055	HISCR	Page 2 soft switch
\$C057	HIRES	HIRES soft switch
\$C050	TXTCLE	Graphics soft switch
— page \$FC —		
\$FC22	VTAB	Vertical tab from CV sub
\$FC24	VTABZ	Vertical tab from accumulator
\$FC42	CLEOP	Clear to end of page sub
\$FC58	HOME	Home text screen monitor sub
\$FC70	SCROLL	Scroll text monitor sub
\$FC9C	CLREOL	Clear to end of line sub

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Don Lancaster Continued from page 28

If you are attacking a very complicated target program, chances are the original author may have had some of the very same problems you did. And, if he was smart enough, he just, possibly, may have built in some problem solving diagnostics.

For instance, the Adam adventures have a "Possible" and a "Did" tracing debugger that you can access with two keystrokes. Zork includes a hook that lets you stop the action after each code module, and print out whatever you like, such as the files just accessed. Zork will also give you a complete list of rooms with just a few keystrokes. A few minor changes to Wizard and the Princess and you get a guided tour of all the rooms.

Be on the lookout for any diagnostic helps that may be built into the program. Then,

see just how you can tap them.

Breakpoints are another way to tackle a program. What you do is reach into the target program at a place where you want it to stop, and insert a \$00 or BRK command. When the Apple reaches this point in the program, it will stop and immediately do a software interrupt.

What happens next is decided by which monitor ROM you have in use. If you have the old ROM, the break puts you in the monitor and displays all of the working registers. If you have the autostart ROM, the BRK commands does a jump indirect to the address contained in locations \$03F0 (low) and \$03F1 (high). You can go from this address into the monitor, or else, directly to another snoop program that spells out what each and every pointer and indirect address is up to.

There is one clinker in the works when you use BRK. You might need the old ROM to gain control of the program so

that you can change \$03F0 and \$03F1, and then switch to the autostart one. A "protected" program under autostart will never let you get down into the monitor or change any locations. Use of either ROM card with a hardware change-over switch often can get you out of this bind.

A breakpoint can be used as anything from a scalpel to a cannon, depending on what you want to do and how large a hole you want to blast in the target program.

Drawing a flowchart may help you. I don't use that method too much since it sounds like something the dino people would want you to do.

The addressing modes that give the 6502 microprocessor its extreme power are the indirect ones. These include jump indirect, indirect indexed, and the rarely used index-

ed indirect. All of these are identified by an address in parenthesis following the mnemonic. A lot of setting up is needed to use these locations. Most often, an address pair on page Zero has to be set up ahead of time.

Understanding the real address used for an indirect instruction can be the key to cracking tough codes. It pays to spend lots of time being sure you know exactly where these addresses are going to and the reasons that they are doing so.

Things really get interesting when you get involved in double and triple indirect addressing, as is common in adventure programs. The code may go to some base address, pick an address pair out of a file there, and use that address as an indirect pointer in another instruction. If the files happen to be longer than 256 bytes, then

double indirect is needed, rather than a simple indexed instruction.

Patience and practice are essential to cracking indirect codes. If all else fails, replace the indirect op code with BRK command. On the break, get into the monitor and check the locations used to hole the indirect address.

Hooks are attachments you make to the program to gain partial control. You might write you own small "host" program and let it "borrow" subroutines off the target program. This is one possible way to dump files off protected disk tracks. Once you are able to use and control key subroutines in the target program, you are well on your way to solving everything else.

The tape cassette is often ignored. Yet the tape system is a very valuable tool. One "protection" scheme used involves putting a program in the same space where Apple DOS 3.3 would normally reside. A custom DOS is then put somewhere else and there is no immediate way to save the program entered under DOS 3.3, since booting the DOS 3.3 overwrites and, thus, destroys the program.

But, the cassette doesn't care. It can save any code in any location at any time. One thing you can do is move the target code down in memory below DOS, save it to cassette, and then boot the DOS. Save this lower version on DOS and, then, add a "move" command that puts it back where it wants to sit.

Cassettes are also useful in upgrading between various DOS versions. They are slow, unreliable, and unwieldy, but they just might work if all else fails.

The single-step and trace features on the old monitor are very useful on some parts of some programs, particularly if you dump them to a printer. But watch out that you don't try to trace a delay loop, such as the one that waits for a disk drive motor to come up to speed, so a two-second delay will take several days and miles of paper to print. Sometimes you can break into the loop, reset the counter location, and continue. Other times, you'll have to combine single step or trace breakpoints. Run the code till you hit the breakpoint, and then single step from there.

Tracing to a printer is one very good way to crack indirect addresses to find the files that they work with.

Beware of tracing parts of programs that read the screen, since tracing and displaying can interact. For instance, a

Table 4. Complete Script of HRCG

ADDRESS	COMMENTS
\$8DFF	Hard entry point. Clears screen and prints header, connects HRCG hooks.
\$8E02	Soft entry point. Connects HRCG but does not clear screen.
\$8E05	Version number x 10.
\$8E06-8E07	Base address of default character-generator set. Defaults to \$92FF.
\$8E08-8E09	User subroutine A starting address called by option Y. Defaults to subroutine return RTS.
\$8E0B-8E0C	User subroutine B starting address called by option Z. Defaults to subroutine return RTS.
\$8E08-8E1E	Hard entry routine. Sets I/O hooks, then reconnects DOS. Switches to HIRES full screen. Restores DOS and default parameters. Displays primary. Switches to graphics.
\$8E42-8E5C	Stash holding ASCII-coded title and version. Used during cold entry.
\$8E42-8E73	Stash holding all working flags —
\$8E5F	\$80 if previous key ESC \$00 otherwise
\$8E60	\$80 if alternate characters \$00 if default characters
\$8E61	\$20 if page 1 primary \$40 if page 2 primary
\$8E62	\$00 if normal video \$7F if inverse video \$80 if overstrike video \$C0 if complement video
\$8E63	\$80 if transparent mode \$00 otherwise
\$8E64	\$60 if transparent mode \$00 otherwise
\$8E65	\$00 if scrolling \$FF if wraparound
\$8E66	\$00 if caps lock \$80 if lower case \$C0 if single capital
\$8E67	Base add low of set in use
\$8E68	Base add high of set in use
\$8E69	Save of \$8E61 while block
\$8E6A	Save of \$8E62 while block
\$8E6B	Save of \$8E63 while block
\$8E6C	Save of \$8E64 while block
\$8E6D	Save of \$8E65 while block
\$8E6E	Save of \$8E66 while block
\$8E6F	Save of \$8E67 while block
\$8E70	Save of \$8E68 while block

Table 4 Cont. Complete Script of HRCG

ADDRESS	COMMENTS
\$8E71	\$00 if normal display \$FF if in block mode
\$8E72	CH horizontal position
\$8F73	CV vertical position
\$8E74-8EAC	Enter HRCG via keyboard hook. Save A, X, BASH, and BASL. Debounce keyboard and flash cursor till key is pressed. Reset keyboard strobe.
\$8EAD-8F17	Check keyboard for ESC or CR. If a CR, process via sub \$928D. If an ESC, process I, J, K, M for cursor motions. Then, clear EOL if E or clear EOS if F. Process A, B, C, and D cursor motions.
\$8F18-8F27	Enter HRCG via output hook. Save A, X, and Y. If a number and preceded by ESC, change character-set number via \$8F86. If a control command, clear Carry if a function and set Carry if an option. If a letter from @ to Z, process by getting address from stash \$8F48 and doing an indirect jump.
\$8F48-8F7D	Stash of 27 addresses for menu selections A-F. Selection @ does an immediate RTS. Address picked by \$8F28.
\$8F86-8FA3	Function A. Alternate character set. If a number from 0-9, calculate new base address and store in \$8E67.
\$8FA4-8FA9	Option A. Put # \$20 in flag \$8E61 to switch to primary page 1.
\$8FAA-8FCB	Function B. Begin block display if not already there. Put \$FF into flag \$8E71. Move flags \$8E61 through \$8E67 to \$8E69 through \$8E70 as temporary save. Move CV and CH into flags \$8E72 and \$8E73.
\$8FCC-8FD1	Option B. Put # \$40 in flag \$8E61 to switch to primary page 2.
\$8FD2-8FDE	Function C. Carriage return. If not below bottom, do CR via \$9204.
\$8FE2-8FEC	Option C. Complement display by making flag \$8E63 a # \$C0 and \$8E64 a # \$00.
\$8FED-900C	Function D. Block display off. If in block mode, move flags back to \$8E61-8E68. Reset block flag and CH flag to zero, CV flag to bottom.
\$900D-901A	Option D. Display primary. Switch to page One. Check primary flag and switch to primary flag page.
\$901B-9022	Function E. Clear HIRES page to EOL using \$928D. Then, clear text page using monitor CLEOL.

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clear-to-end-of-screen will hang during a trace, since trace keeps resetting the screen locations. If you are printing, defeat the screen echo during these times.

Another custom attack method is to chip away at the target. Your goal may seem hopelessly buried in the middle of stuff that seems so complicated that it will take you forever to understand. If all else fails, attack the easy stuff on the outside. Do this even if the easy stuff seems to have nothing at all to do with your goal. The part of the code that outputs characters to inputs data are usually easy to read. Continue carving away on anything that looks like it might shake loose. What this indirect attack does is reduce

the size of what is left to a point where you can hack at it directly.

A big plus for the indirect attack is that it can show you the program author's style and where his head is at. Does he use self-modifying code? How does he handle multiple choice addresses? Does he use the indirect commands effectively and gracefully? Is he using mostly branches, or mostly jumps? How elegantly or how clumsily does he handle 16-bit addresses and long files? Does he extensively use the existing monitor, DOS, and BASIC subs, or is he reinventing the wheel? How clean is his organization? Is the program designed from the ground up for an Apple, or was it obviously modified from a program originally designed to run on some inferior machine? Answers to these questions can

simplify very much the cracking of the rest of the code, since most decent programmers tend to be consistent in how they do things.

If the code seems ridiculously obscure, attack the fundamental subroutines. These subroutines are the ones that won the popularity poll (the ones with all the dots). The subs to hit first are those that will not call any other subroutines, but will go ahead and do direct and obvious things. Common things that fundamental subroutines will do include searching a long file for a value, calculating an address, or making a hex-to-decimal conversion.

Once you understand these fundamental subroutines, you don't have to go through them each time they crop up, since you know what they do. Create meaningful names for

these fundamental subroutines and they will help you a lot in your attack.

Asking for help is an obvious thing to do. There is nothing more infuriating than having an 8-year-old boy, just in from off the street, make some casual comment that completely sums up what it just took you months to find out the hard way. So discuss the target program and its attack. Don't only do it with "experts," but rap about it to anyone who will listen. Chances are their heads are in other places and might put things in a new light for you.

The python force feeder takes some special hardware, but it can be very effective. A force feeder is some hardware and software modifications that include a super-powerful bus driver, say a 74S245, or may be three of them in

parallel. When you tell it to do so, it substitutes its own code for what the computer is supposed to be working with.

For instance, even the old monitor ROM can't help plowing part of the display page, the first few keybuffer locations, and part of page Zero when it is activated. A sneaky programmer can hide things in plowable locations. But not so with a force feeder. Besides being able to force a monitor reset any time you like, a force feeder can substitute anything at any place in the program. It can also move copies of plowable locations to unplowable ones for analysis.

As a much simpler example for force feeding, consider the "top display line" copy protection hoax. What you do is switch to HIRES and, then, put a key jump or some other "magic" code that you want "hidden" on the top line of text display page One, starting at location \$0400. This code is called early in the program and the program bombs if the code is not there. Naturally, the code gets erased immediately after use.

This, in theory, makes any messing with the program impossible. Any tampering at all will scroll up the display page and destroy the magic code. Sounds both bulletproof and infuriating.

In reality, this is only a "seven-second" copy protection. What you do is force feed the Apple by making it display only text page One, and this "hidden" code actually leaps out at you, shouting to be heard. To force feed the page One display, remove integrated circuit F14 and ground pin No. 6 of the socket at F14. The hidden bytes will appear in Apple video-screen code, rather than op code, but if you got this far, that just adds to the fun.

Similar force-feeding games can be played with most of the Apple soft switches that are needed for analysis or debug.

Another handy debug trick is the partial boot. Instead of letting the target program completely boot, you only let it go so far and, then, analyze what you have. This catches code modules before they are moved to cover DOS, and so on. For instance, the program, Pool 1.5, is generally considered to have exceptionally good, or "three hour", copy protection. But, use a partial boot and the "three-hour" protection drops down to a much more convenient "eighteen-minute" protection. More elegant "boot tracing" can also be done.

The trick here is to carefully watch the disk drive with

Table 4 Cont. Complete Script of HRCC

ADDRESS	COMMENTS
\$9023-902A	Function F. Clear HIRES page to EOS using \$927A. Then, clear text page using monitor CLEOS.
\$902B-903F	Function H. Backspace. Go left one character if entry at \$902B. If screen left, go up one line.
\$9040-9047	Function I. Set inverse video flag by putting #\$75 into \$8E62.
\$9048-904F	Function K. Set caps lock flag by putting #\$00 into \$8E66.
\$9050-9057	Function L. Set lower-case flag by putting #\$80 into \$8E66.
\$9058-9072	Unsupported function M. Apparently a scroll diagnostic, once reached by CTRL-S, CTRL-C.
\$9073-907A	Function N. Set normal video flag by putting #\$00 into \$8E62.
\$907B-9082	Function O. Set option flag by putting #\$40 into \$8E60. Next key will complete option command.
\$9083-908D	Option O. Pick overstrike mode by #\$00 into \$8E63 and #\$00 into \$8E64.
\$908E-9095	Function P. Clear HIRES page via \$9270 and text page via monitor HOME. Note that an image of the HIRES screen is put on text page 1.
\$9096-909E	Option P. Pick print mode by putting #\$00 into \$8E63 and \$8E64.
\$909F-90AD	Function Q. Home cursor inside text window. Move upper-left values to CH and CV. Then, reset text screen via monitor VTAB.
\$90AE-90BA	Function R. Reverse overlay by putting #\$C0 into \$8E63 and #\$60 into \$8E64.
\$90BB-90C2	Function S. Shift next character by putting #\$C0 into flag \$8E66.
\$90C2-90C8	Option S. Pick scroll mode by putting #\$00 into flag \$8E65.
\$90C9-90D5	Option T. Set transparent mode by putting #\$80 into \$8E63 and #\$60 into \$8E64.
\$90D6-9103	Function V. Text window, upper left, by resetting WNDLFT and WNDTOP after check for on-screen values. Transfers vertical position to CV flag if not in block mode.
\$9104-9124	Function W. Text window, lower right, by resetting WNDWIDTH and WNDBTM after check for on-screen values.

Table 4 Cont. Complete Script of HRCC

ADDRESS	COMMENTS
\$9125-912A	Option W. Set wrap mode by putting #\$FF into \$8F65.
\$912B-914E	Function Y. Open to full text screen by putting #\$00 into WNDLFT and WNDTOP and #\$28 into WNDWIDTH and #\$18 into WNDBTM. Save as CH and CV flags if not block mode.
\$914F-9151	Option Y. Call user subroutine A by jumping to jump command stored at \$8E08. Defaults to RTS.
\$9152-9177	Function Z. Restore defaults. Reset all flags to #00. Set full text window. Pick default character set. Display primary page. Reset user subs to RTS.
\$9178-917A	Option Z. Call user subroutine B by jumping to jump command stored at \$8E08. Defaults to RTS.
\$917B-9196	Begin character entry. Exit RTS if option flag set. Check case mode and change to upper case or reset shift flag if needed.
\$9197-91C4	Continue character entry. Calculate character location and save as \$EE and \$EF. Calculate screen base address location and save as \$EC and \$ED. This is the top dot row for any character position. The running dot row address gets held in \$2A and \$2B. Then, the character is saved on page One text screen. Like so ...
	\$28-29 - text screen base address \$2A-2B - HIRES dot row address \$EC-ED - HIRES base address \$EE-EF - Character-set base address
\$91C5-91F7	Continue character entry. For eight dot rows, get the character dots and inverse if needed. Get the dots already on the screen; then, AND or OR with character dots if needed. Then, return result to the screen. Next, calculate the address of the next lower dot row and repeat till all of the characters have been entered.
\$91F8-9220	Move cursor. Go one to the right unless at extreme right of the window. If a CR is needed, go down one line unless at extreme bottom of window. If at bottom, check flag for scroll or wraparound, and continue.
\$9219-9220	Wraparound mode. Set WNDTOP to top of text window. Do a monitor VTABZ to recalculate base addresses.
\$9221-926F	Scrolling mode. Dot line source is \$2A-\$2B. Destination is address

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the cover off and time out the different parts of the loading and protecting process.

By the way, there's one sure-fire way to read any disk at any time. Just glomp a logic analyzer, with 6502 personality module in it, onto the CPU and you are home free. Unfortunately, you can buy a dozen Apples for the price of one better grade logic analyzer, so this ultimate weapon does not see much use.

Change detection is another interesting attack method. However, I haven't fully explored this one. What you do is dump part of memory, run a portion of the target program, and then see what changed. By finding out how, when, and why that change took place, you can often gain all sorts of insight into what is going on.

Some day, I would like to build the ultimate change

detector. This would take a DMA modification to the Apple that would let a second Apple or some type of dedicated hardware give you an instant and separate picture of memory activity while the main program was running. One display would show what the program was doing, while the second would show you each and every memory location of interest. Ideally, such a program should present any location or any block of locations that you want and would clearly identify them. With this ultimate change detector, you can actually watch the program while it was doing its thing.

A variable-speed feature would also be nice to have, so you could slow down or stop key activities without waiting forever for them to get through a delay loop or whatever.

We've already seen how altering files can tell you lots of things in a hurry about your program. Sometimes you are

shooting in the dark since some file locations may only rarely be used or might be used only in an obscure way. File changing is certainly worth a try.

If you are going to change the target program or interact with it, it might pay to put the program on your own assembler and create your own source code. This lets you add your own hooks and make changes of your own choosing inside the target program. The EDASM on the DOS Toolkit is ideal for this. Assembling your own source code backwards from the object program is quite a hassle, though, and you shouldn't try it unless you have pretty much cracked everything else. Disassembler programs are also available that will "capture" code for your favorite assembler.

Sitting on your program is often overlooked. Just walk away from the attack for hours or days, and things that should have been obvious all along will leap out at you. Let your subconscious work on the puzzles that are holding you up.

It works.

Another thing that can help is to try attacking a similar program, either by the same author or by one that does the same thing in a simpler or easier-to-understand way. The insights you get from one program will help you attack the other program.

Deciphering special codes

may be needed in longer adventures. These codes are more often used to make code more compact than they are to purposely "hide" the meanings of what they hold. The trouble is that most compaction schemes used also do a most thorough job of masking everything that the file holds.

For instance, in Zork, the ASCII strings are compacted so that two bytes hold three characters. Some newer adventures use paired letter or similar codes to remove the redundancy from text messages so that long text files will fit inside the machine. This is how the Colossal Cave adventure from Adventure International manages to get everything that once demanded a mainframe dino into a 48K Apple without needing repeated disk access.

About the only way to attack these codes is to go into code modules that decipher them. Then, decipher the deciphered. Single step, trace, or breakpoint access code modules till they show you how to read the file. Usually, there will be some obscure command or program feature that will do things a lot faster or simpler than the others. Trace this command or feature out and let it crack the code for you.

The last resort, of course, is to give up. Go back and attack something that is simpler.

My first machine-language attack of a major program was

Adam's Pyramid of Doom. This was done on a wilderness firetower using nothing but a 6502 pocket card. It literally took all summer, but it led to this attack method, and there is no better way to learn machine-language programming.

CONVERGE ON YOUR GOAL

Just as soon as you have the structure pretty well defined and as soon as you have cracked most of the code modules, return to your original goal and solve that particular problem.

Our goal in HRCG was to find the scroll hooks. By now, they should leap out at you.

Just as the cursor is about to go off the screen at \$9208, a check is made to see whether scrolling or wraparound is to be used. If scrolling is active, \$9213 does a jump to the scroll subroutine starting at \$9221. Specifically, \$9214 will hold the low address and \$9215 will hold the high address of the scrolling subroutine.

Just change these hooks enough so that you can use your own scrolling subroutine.

Summing up...

The HRCG scroll hook is at \$9214.
\$9215 holds the address low of the scroll subroutine.
\$9216 holds the address high of the scroll subroutine.
The existing scroll subroutine starts at \$9221 and ends with \$926F.

Table 4 Cont. Complete Script of HRCG

ADDRESS	COMMENTS
	SEC-\$ED. Destination is eight dots above source. Starting at the top of the screen, scroll downward, loading from (\$2A) and storing at (\$EC). Y register handles CH position, stepping from WNDWDTH downward. X register handles position of eight rows per character. One entire dot row is entered, then another until done. After a line is remapped, the base address of the next line is calculated, making the old source the new destination, and calculating a new source. This continues until the entire screen is mapped. The bottom line is then cleared via \$8E63.
\$9270-9279	Clear screen. Set CV to WNDTOP and CH to WNDLFT and continue via \$927E.
\$927A-928C	Clear to end of screen. From present CH and CV, clear to EOL via \$9291 as often as needed to empty screen.
\$928D-92CA	Clear to end of line. For eight dot rows, calculate address, then remove character from screen. Inverse background if needed. Y register works from CH to WNDWDTH doing one dot row at a time. X register handles dot rows, working from top of character down.
\$92CB-92DF	Calculate HIRES base address. Divide CV by two. Go into the table in \$92DF-92EA and lookup base address value. Process this value and store in \$2A and \$2B.
\$92DF-92EA	A stash of table lookup values used to calculate HIRES base addresses needed by \$92CB or \$92CD.
\$92EB-92FE	Apparently unused garbage.
\$92FF-96FE	Bulk file of default character set. Holds dot patterns of all ASCII characters. The seven least significant bits hold the horizontal dot pattern IN REVERSE for one dot line. Eight successive bytes hold the dot pattern for one character, arranged from top to bottom. Locations \$92FF-93FE hold numbers and symbols. \$93FF-94FE hold upper-case alphabet, and \$95FF-96FE hold lower-case alphabet. Bottom dot row is blank except for descenders. 96 characters total.

WILL THE REAL LISTING PLEASE JUMP OUT?

There are times when the disassembler in the Apple monitor lies like a rug.

A disassembler always assumes it is working with valid op codes. It starts with the first code byte it finds and, then, decides what operation the Apple is to do. Depending on the particular op code, one, two, or three bytes will be needed to complete the operation.

For instance, the CLC or clear carry command is an implied addressing instruction handled with a single byte. No further information is needed. The LDX #05 immediate command takes two bytes, one to tell you what to do and one to answer "How much?" The STA \$4050 command uses absolute addressing and takes three bytes, one to tell us what to do and two bytes to answer "Where?" by giving us address low and, then, address high values.

Thus, a disassembler will automatically jump one, two, or three bytes to get to the start of the new instruction. The disassembler always assumes it is working with valid code from a legal starting point.

If either the starting point is wrong or if what is being disassembled is not legal code, the "lister" starts lying.

Suppose we have these bytes stashed in memory...

\$0800- 80 8D AD 02 A5 18 EA

Here is what you get if you try to disassemble this code from various starting points...

\$0800- 80 ???
\$0801- 8D AD 02 STA \$02AD
\$0804- A5 18 STA \$18
\$0806- EA NOP

\$0801- 8D AD 02 STA \$02AD
\$0804- A5 18 STA \$18
\$0806- EA NOP

\$0802- AD 02 A5 LDA \$A502
\$0805- 18 CLC
\$0806- EA NOP

\$0803- 02 ???
\$0804- A5 18 STA \$18
\$0806- EA NOP

We see that we get a different disassembly every time, depending on where we start from. Which one is correct?

The correct disassembly is the one that begins with the first valid op code on the list. The first valid op code is often pointed to elsewhere in the program by a jump, a branch, a subroutine call, or an external entry point.

You can expect the "lister" to lie about one-half of the time when it comes out of a file or dead code and starts into legal code.

Usually the "lister" will correct itself after two or three wrong entries. So, you usually only have to worry about the first few entries into valid code.

If what you have just listed seems dumb, try listing from one above or one below where you think the legal code starts. Most of the time, there will only be one rational and sensible starting place and the valid code will leap out at you.

But remember that the "lister" will only tell the truth when it has both true code and a true starting point to work with.

Easy, wasn't it?

If not, go through a few practice target programs and see how fast and powerful this method can be.

WRITE IT DOWN!

Surely you don't want to go through all this a second time on the same target program. So, carefully write down everything you learned in some form that works for you.

Make a clean copy of your analysis on the second listing you made. Also, make a neat new table of variables, a new cross-reference, and write a complete new script. Put most of this information onto disk so that you can have printable and updateable copies for later use.

The insight that you have now will be long forgotten in a month. Be sure that you will be able to later recover what you already have done, and will be able to do so both quickly and hassle free.

Resist the urge to pull a "EUREKA! I have found it!" and run off with only your limited goal met. Do so, and the key information will disappear down the tube somewhere

Continued on page 35

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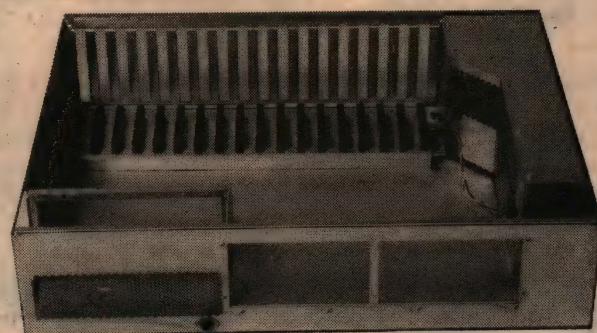
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Don Lancaster
Continued from page 33

and all will be lost.

The following outline sums up all the steps involved in tearing into machine language code. Go back over them, and you'll find three parts to the attack. First you prepare yourself, then you attack the target program, letting it reveal itself through its form and structure. Finally, you follow up the attack to reach your goal.

Here is a quick summary of the tearing method...

TEARING INTO MACHINE-LANGUAGE CODE

PREPARATION

- () Assemble the toolkit.
- () Grok the program.
- () Go to the horse's whatever.
- () Set a limited goal.
- () Empty the machine.
- () Find where the program sits.
- () List and hex dump the program.

ATTACK

- () Separate action from bulk files.
- () Paint subroutine returns green.
- () Paint subroutine calls orange.
- () Paint absolute jumps pink.
- () Paint relative branches blue.
- () Separate modules and stashes.
- () Identify files and stashes.
- () Attack variables and constants.
- () Paint housekeeping yellow.

FOLLOW UP

- () Make a list of variables.
- () Write a script.
- () Customize the attack.
- () Converge on your goal.
- () WRITE IT DOWN!

Practice makes perfect. Try it.

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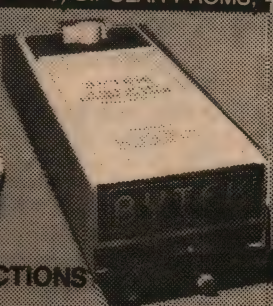
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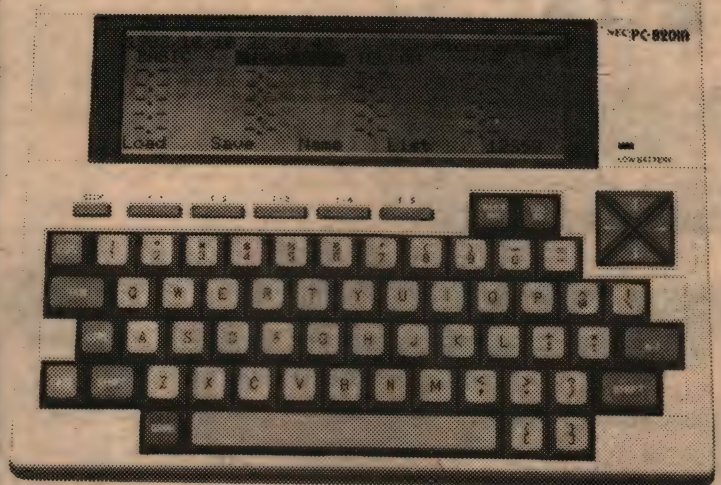
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by R.E. DeVore

As an introduction, let me tell you a bit about myself and what I propose to do in this column.

I have used home computers for about three years and have

started and run two users groups for two different home computers. I have been writing product evaluations for various publications for over a year and a half.

I plan to tell you about software and hardware that I have received and used. Since Richard Clope is going to cover the Commodore 64, I will address myself to the Apple and Atari computers.

When the available products permit, the column will have an overall theme. Should there not be enough of a given type of software available, the reviews will cover what I have.

You the readers will really determine what is covered.

Write to me in care of Computer Shopper and tell me what you would like to see in this space and I will try to oblige. My background is as an end user rather than a programmer so I will not be delving into programming hints myself but will be glad to pass along any that are sent in.

Since school is occupying the minds of a lot of readers, I will see what educational software has come to hand.

The first item to come to hand is "Step by Step" from P.D.I. (Program Design Inc.). This is a method of learning how to write programs on your Apple in Applesoft BASIC.

The program includes four

cassettes and two diskettes that have the actual lessons that you work with. The fifty page manual provided works with the disk based lessons to help you obtain a knowledge of the BASIC language.

The manual is somewhat unusual in that it tells the user at the start that learning BASIC is not all that easy and requires some work. This is in contrast to most manuals which lead the user to believe that anything to do with a computer is easy, when in reality there is learning involved that may be rather complex.

The use of voice tracks in conjunction with disk based programs seems to be unique with Program Design, Inc. I find that in the instances that I have used it, the programs are easier to learn or use than they would be without that feature.

The new Step by Step takes you by the hand and demonstrates simple BASIC constructions up to and including some color and graphics. At no time does the program or its literature say that when you finish you will be an accomplished programmer.

Rather they get you started along the road to the point where it is possible to look at other program listings and have the ability to see what was done and to make changes

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to see what will happen. For those of you who are interested in learning beginning BASIC on your Apple Computer, I feel that this program will be quite useful.

Looking further brings up Wordworx from Reston Software. This runs on the Apple II, II+, and IIe with 48K of memory. The package contains a double-sided disk with two different programs, one on each side.

The first side has Myspellery on it. This is a word spelling game in which you are given clues showing the phonics of the word. From this you first determine the word then how to spell it. There are two levels of difficulty that may be selected as well as the ability to make up your own set of words to be used. This is a two player game but it is fun to form two groups and compete.

Each play of the game shows a total of six words with a possible score of 100 points for each. A perfect score is therefore 600, a figure I have not yet seen. The program gives clues; each of them deduct 10 points from your possible score. If you do not guess the word correctly, the answer remains a secret. This is a feature that I disagree with. The game is difficult and without knowing where you went wrong does not teach you anything.

The second game in this package is called Sentence Maker. The program provides a string of five letters from which the player or players make up sentences that are grammatically correct including the punctuation. When the first player has made up a sentence, the second is asked if the result is an acceptable sentence. If the second player agrees that it is, the first player gets 25 points for the effort.

Each of the strings of letters come from a secret sentence that may be from a movie, play, quotation or some such. Should a player pick one of the words from the secret sentence, they are rewarded with an additional five points. If they type in the complete sentence, they get the same twenty five

points that they would have gotten from any correct sentence. This seemed somewhat incongruous. The play continues as long as sentences are made up.

The second level of this game provides the source of the secret sentence. This can really make you rack your brain to figure it out.

A lot of the learning process involved comes from determining if the sentence typed in is an actual sentence or not. The game is rated for children and adults. In usage, adults found it to be quite challenging and my children enjoyed playing it. They at times did better than the adults.

Walt Disney has set up a division to produce computer software. Their first effort is for the Atari computer and used the cartoon character Mickey Mouse to teach children from 7 to 10 years of age. The program is called Mickey in the Great Outdoors.

This disk has four distinctly different games on it. They are separated into two sections, Mickey goes Hiking and Mickey goes Exploring. All of the games use a joystick for input.

The first game in Mickey goes Hiking involves Mickey trying to cross a stream. There is a bridge made up of stepp-

ing stones each of which has a word on it. These make up a sentence but one of the words is missing. To get across the stream, Mickey has to use a bow and arrow to shoot the correct word that is going overhead in a cloud along with several others. As the game progresses, the clouds move faster and a turtle swims towards the stepping stone. If the turtle gets to the stone before the correct answer is gotten, the player will lose points and the computer will finish the sentence.

The second part of the Hiking portion is a scrambled letter game in which the player uses the joystick to move the letters to the correct order to spell the word. They have 90 seconds to do this in. There are four letters in the words and are shown in a flower. There is a shelf above the flowers that

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the letters are moved to when spelling the word involved. There are ten words to be unscrambled.

When these two games are complete, Mickey is shown sitting at his campfire indicating that the hike is over and the screen shows the player's score for the two activities.

In Mickey goes Exploring, the first part has Mickey with a butterfly net with which to catch the butterfly that has the correct answer to a mathematical equation shown at the

bottom of the screen on a set of toadstools. The equations involve addition, subtraction, multiplication and division. The answer required may be any portion of the equation. Using the joystick to control the net, the answer is caught and if correct, the butterfly lands on the right toadstool and a new equation then comes up.

The second part of the Exploring portion shows Mickey in a canoe over some lily pads.

Continued on page 38

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Home Computer Users Continued from page 37

There is a row of lily pads with a number series shown on four of the pads and two blank pads. Above these are a row of pads with various possible answers on them. A frog jumps from left to right across these. The player uses the joystick to cover the frog with Mickey's paddle when the frog is on the lily pad containing the correct answer. As the play progresses, the lily pads with the answers start moving left and right across the screen and the frog hops faster. This makes the game more exciting.

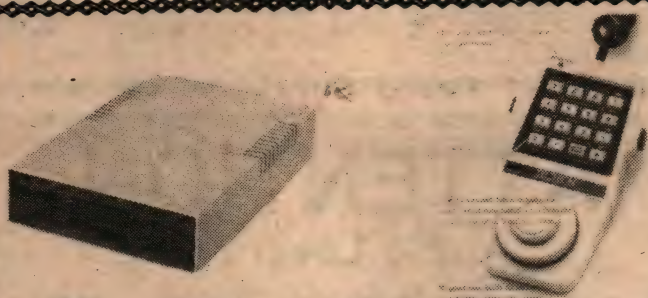
When this portion is completed, Mickey once again is

shown sitting at his campfire and the score for each section is shown on the screen.

Over the Christmas holidays I saw a large number of children play this game and they all seemed to enjoy it very much, even those younger than the program was designed for.

Mickey in the Great Outdoors has a 16-page manual that not only does an excellent job of explaining how to play the games and their intended purpose, but ended with some suggestions on how to do similar activities in your home and outside without the computer. I found this to be a nice addition and unique among the programs that I have seen.

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PractiCalc(tm) Now Available For Apple II And IIe

Hundreds of thousands of Apple users can now benefit from PractiCalc, the powerful, professional spreadsheet program developed by Computer Software Associates. The program, PractiCalc II, was introduced by Micro Software International at the 1983 Winter Consumer Electronics Show.

"PractiCalc II is an advanced, powerful spreadsheet program for the Apple II and IIe microcomputers. It performs many functions previously limited to more expensive spreadsheets, yet will retail for only \$69," commented Sandy Ruby, Vice President of Research and Development for Micro Software International,

the exclusive distributor of CSA products.

Released earlier this year for the Commodore 64 and VIC 20, the original PractiCalc immediately became a best-selling program. It was singled out as the only program in the Home Management category to be awarded Software Showcase status at the Consumer Electronics Show this summer.

PractiCalc II has all the features of the original program and much more. Its fifteen new features include advanced editing capabilities, variable column width in all columns, upper and lower case entry and printing for the IIe, the ability to do long labels, automatic and manual recalculation, and an on-screen default menu; PractiCalc II is also extremely fast (four times the speed of Calc Result and

two times that of VisiCalc).

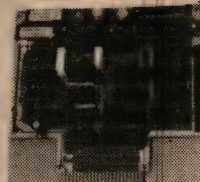
In addition to all the traditional spreadsheet functions, PractiCalc II does those unique to PractiCalc, like full alpha and numeric sorting, alpha and numeric search, prompts for entry during calculation and printing of list formulas.

According to Robert Shapiro, Executive Vice President of Micro Software International, "PractiCalc is a state-of-the-art program that, at last, offers owners (whether business or home) of the Apple II and IIe the benefits of an advanced spreadsheet for a fraction of the cost."

For additional information, contact Micro Software International, The Silk Mill, 44 Oak Street, Newton Upper Falls, MA 02164; phone (617) 527-7510.

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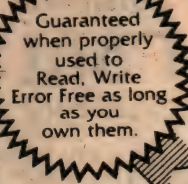
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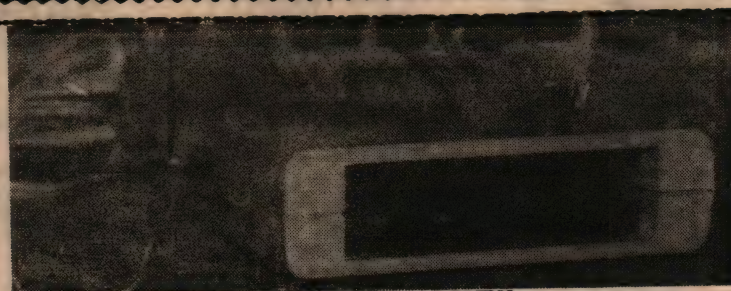
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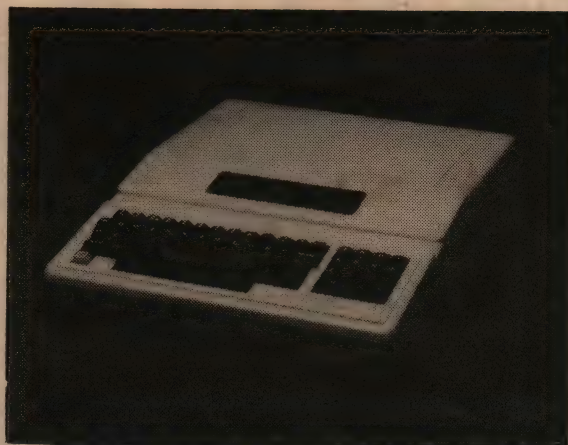
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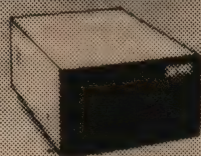
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Duodisk, a new disk drive unit from Apple Computers.

A new floppy disk drive unit which contains two half-high, 140-kilobyte drives side-by-side in a single case was introduced recently by Apple Computer. Called Duodisk, the new drive offers compact styling, improved technology and full compatibility with Apple II software at a lower price than two separate Disk II drives.

Duodisk sets a new standard of economy for Apple II users, meeting the dual-drive configuration needed for many software programs, simple back-up and ease of use. This new drive is suited to the professional, small business, office, higher-level education and developer markets where two drives are required for most applications.

Duodisk is exactly the width of the Apple II and can sit conveniently between the computer and monitor. Its case was designed to complement the Apple II and the Monitor II, thereby creating an integrated system look.

Technical improvements include a new disk eject mechanism and an advanced head positioning mechanism which gives a more precise reading of half-tracks.

Duodisk comes with a controller card that connects it to any Apple II, Apple II+ or Apple IIe. It is operationally identical to the Disk II floppy disk drive and runs Apple II software.

Price and Availability

Duodisk is available now from all authorized Apple dealers worldwide and carries a U.S. suggested retail price of \$795. For comparison, it would cost \$940 to purchase two Disk II's and a controller card.

Duodisk is covered by Apple's standard 90-day warranty. Apple's extended service plan, AppleCare(tm), is available for coverage beyond the first 90 days.

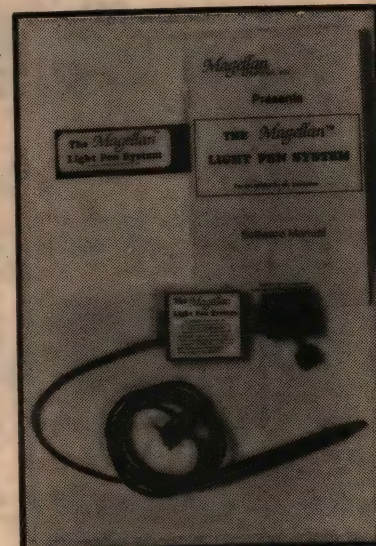
For further information contact Apple Computer, 10260 Bandley Drive, Cupertino, CA 95014, or phone (408)996-1010.

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The Magellan Light Pen System

Magellan Computer, Inc., has introduced the Magellan Light Pen System for the Apple II+ and IIe. Unlike graphics tablets and joysticks which require a "mental translation", the light pen interacts DIRECTLY with the monitor or television screen. High resolution detail allows single-dot editing on the APPLE's hires display. The built-in pushbutton gives the user maximum control over drawing operations, eliminating distracting interaction with the keyboard. In contrast to competitive models that utilize one of the expansion slots, the Magellan Light Pen is connected to a miniature electronic module which is interfaced via the computer's game port. Its I/O transparent design allows game paddles, joysticks and other accessories to occupy the port as well.

Included with the system are the QUICK-DRAW and AMPER-PEN software packages. QUICK-DRAW is a complete graphics-creation program which allows the user to easily create and edit commercial-quality graphics designs. AMPER-PEN pro-



The Magellan Light Pen System

vides the means to incorporate light pen operation into programs written in Applesoft BASIC. The suggested retail price of \$189.95 includes the pen, associated interface electronics, both software packages and complete documentation. Details are available from Magellan Computer, Inc., 4371 E. 82nd Street, Suite D, Indianapolis, IN 46250, (317)842-9138.

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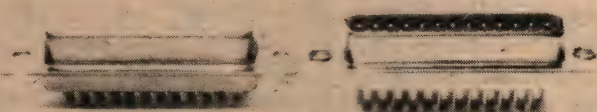
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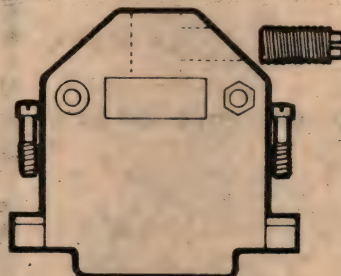
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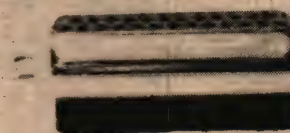
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P25S	4.39	4.02	3.65
P37P	4.30	3.94	3.58
P37S	8.18	7.50	6.82
P50P	5.50	5.04	4.58
P50S	10.70	9.81	8.92



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R9S	2.60	2.39	2.17
R15P	2.98	2.73	2.48
R15S	3.10	2.84	2.58
R25P	3.72	3.41	3.10
R25S	3.00	2.75	2.50
R37P	4.70	4.31	3.92
R37S	4.90	4.49	4.08
R50P	CALL	CALL	CALL
R50S	CALL	CALL	CALL



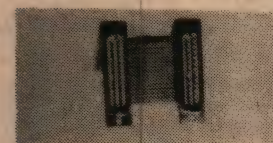
WIRE WRAP

Part #	QTY 1-49	QTY 50-99	QTY 100-up
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W9S	3.20	2.94	2.67
W15P	3.36	3.08	2.80
W15S	4.70	4.31	3.92
W25P	5.40	4.87	4.33
W25S	7.34	6.73	6.12
W37P	6.92	6.35	5.77
W37S	9.90	9.08	8.25
W50P	10.24	9.39	8.53
W50S	13.04	11.96	10.87



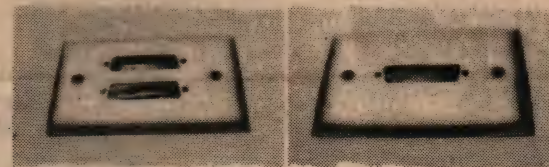
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Sterling Swift Publishing Co. introduced the first microcomputer software package designed to help teach the fundamentals of a sport at

the 61st Annual Meeting of the American Football Coaches Association, in Dallas, TX, last week. 50 Defense Vs. Run is the first of a 5-part series

designed to teach the fundamentals of football. The package, for Apple II's, consists of two disks (each with three lessons) and a Coach's Manual.

"The software will help players and those interested in football, in general, to understand the fundamentals of each position on the team," company President Sterling Swift said. "50 Defense Vs. Run combines instructional tutorials, testing of fundamental concepts and principles, with reinforcement feedback, and graphics (including an automated chalkboard)."

The remaining packages in the CEFT series--50 Defense Vs. Pass, Offense (Run), Offense (Pass), Kicking (Offense And Defense)--will be released later in 1984.

50 Defense Vs. Run is the

result of an extensive effort by Frank Downing (formerly Academic Coach with the Penn State University football coaching staff), Ralph Heimer (head of Courses by Computers, Inc.) and Tim Robinson (a programmer with Courses by Computers, Inc.).

Hardware required to run the software is an Apple II+ or IIe, 48K, DOS 3.3.

50 Defense Vs. Run is available for \$99.95 from Sterling Swift Publishing Co., 7901 South IH-35, Austin, TX 78744, or phone (512)282-6840.

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```
PROC SORT; IN RATES; OUT RATES2; BY DATE; — /* ORDER RATE CHANGES BY DATE */
PROC SORT; IN PAY; OUT PAY2; BY DATE; — /* ORDER PAYMENTS BY DATE */
PROC DATA; IN RATES2 PAY2; — /* COMBINE THE TWO INPUT DATABASES */
TYPE INTERLEAVE; BY DATE; — /* A RATE, THEN PAYMENTS IN THAT RANGE */
LENGTH CURRATE 1; RETAIN CURRATE; — /* CREATE VARIABLE FOR CURRENT RATE */
OUT PAYVALUES (DROP RATE); — /* CREATE OUTPUT DATABASE, NO RATE */
IF IN.RATES2 THEN CURRATE = RATE; — /* NEW RATE STARTED THIS DATE */
IF IN.PAY2 THEN DO; — /* A PAYMENT IN PROPER DATE RANGE */
  VALUE = CURRATE * PAYMENT — /* COMPUTE THE VALUE WITH CURRATE */
  PRINT (@25) NAME, DATE, VALUE; — /* PRINT THE RESULT */
OUTPUT; END; — /* AND WRITE TO NEW DATABASE */
```

"SAUCE changed my whole life as a programmer. It blew PASCAL, FORTRAN, BASIC and the database languages away. I gave them all up and wrote all my new programs in SAUCE. I now write programs in less than 10 percent of the time it used to take. I'm very happy. I've even written programs I could not have written in other languages. Like my program that does 5 sorts and 3 merges on 10 files, and the program can all be seen on my screen at once! Sauce handles my large files easily, even though they are larger than my main memory. It's as if the world's programming was all being done in assembler, and I'm one of the lucky people who have discovered a new language like Pascal or Basic." — Darragh Nagle, Systems Programmer.

Sauce is available for Apple CP/M, IBM PC, NORTH STAR, KAYPRO, RADIO SHACK, and all CP/M and MS-DOS systems with Microsoft interpreted basic and 64K or more. Hard disk compatible. The SAUCE language comes with system disk, reference manual and online documentation. To order, (specify computer system and disk format) send \$495.00 check or money order to:

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Open Access Integrated Software

Open Access is an integrated software package for the IBM PC, XT and most compatible MSDOS computers. It offers advanced functionality, easy to learn and use, English-like commands. It is built around a Relational Database Management System that gives it the power necessary to provide features not found in other integrated packages. Each module in Open Access is so powerful that it is capable of operating as a separate software package.

Open Access uses the most advanced technology in microcomputer software in order to be as simple to use as possible. For instance, information may be transferred from one module to another with just a few keystrokes. Pop up windows make command execution an easy task, and the use of a mouse simplifies com-

mand selection.

Global Program Features Include:

- * A help window, available almost anywhere, to give you that needed reminder.
- * A search window which allows you to see a listing of the files which are available to you. You may select the file you need directly from the window.
- * A calculator window to provide you with a pocket calculator so that you don't need to reach into the drawer for a calculator when you have a computer in front of you.
- * Automatic procedures to make execution of regularly performed tasks a trivial job. Also allows complex

tasks to be entered once and then performed by any office personnel.

- * Ability to interface to other programs which can read and write DIF files.

Information Manager

The Open Access Information Manager is a Relational Database Management System for microcomputers featuring advanced functionality and simple to use, interactive, English-like commands. This module allows you to easily tailor database files, screen layout files, and report layout files to fit the need of your application. Once information is entered into the files it may be quickly retrieved using English-like statements. Once retrieved, records may be

displayed, updated, removed, appended to other files, included in reports or form letters, and/or moved to another Open Access module.

Selected Features Include:

- * Capability to join up to five files at a time.
- * Retrieve records based on up to 64 search conditions and then sort these records on up to 15 fields.

- * "Must Match" feature requires field value to match a valid entry in another database file.

Continued on page 44

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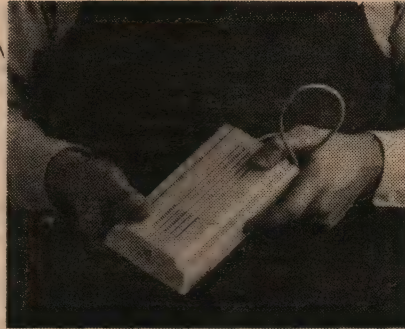
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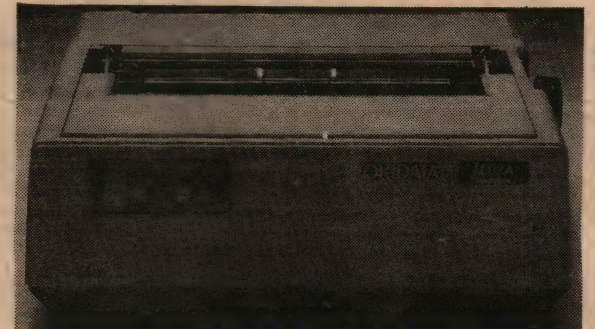
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Open Access

Continued from page 43

- * Form query lets you specify search conditions in a blank record screen and then

retrieves qualifying records.

- * Screen and print layout generators to allow you to design the way you would like to see information

displayed.

- * Mailer capability to generate personalized form letters and mailing labels.

Graphics

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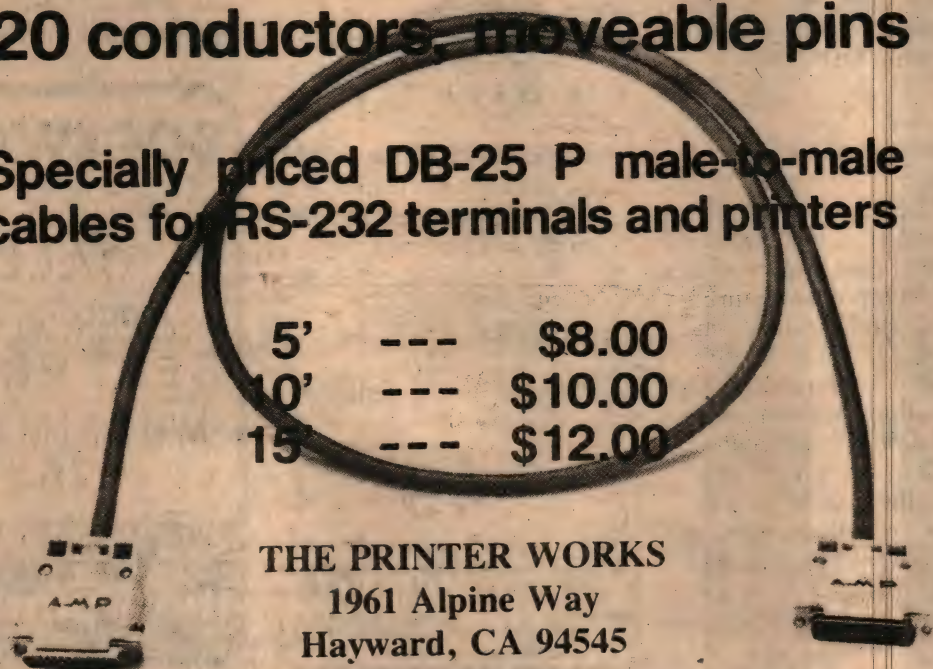
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Graphics module, you may take raw numeric data and create beautiful color graphs. The numeric data may come from another Open Access module or it may be entered interactively in the Graphics module. You may create two-dimensional bar graphs, pie charts, and line graphs. In addition, you may: build three-dimensional bar graphs; overlay bar and/or line graphs on top of each other; or separate bar, line, and pie graphs each into their own separate window.

Selected Features Include:

- * Build a carousel slide show of graphs so that presentations may be made without having to reload new files or configure graphs at presentation time.
- * Alter the color, texture, or outline color of graphs.
- * Alter the entire color palette used for graphs or the background screen color.

- * Print graphs in full color or in black and white.

- * Include text labels for graph axis and graph screens.

Spreadsheet

The Open Access Spreadsheet is the first of a new generation of spreadsheet modules. This spreadsheet not only includes the normal "what-if" processing capabilities found in all other spreadsheet programs, but it also includes "how-to" processing. This is accomplished through the Spreadsheet's Goal Seeking feature. The Open Access Spreadsheet modules includes additional features not found in other "advanced spreadsheet" programs as well as all of the standard features.

Selected Features Include:

- * Goal Seeking to allow for backward solutions. You specify the targets to be reached and the Spreadsheet will tell you the necessary values.
- * Virtual memory to allow over one half million entries per model (with available disk space).
- * Topological recalculation so that you do not have to worry about forward and

Continued on page 45

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Open Access Continued from page 44

backward formula references. The Spreadsheet will always calculate formulas in the correct sequence.

* Channel links to up to three additional models which you may reference directly and/or view on the screen in separate windows.

* Explicit Consolidation to enable you to produce a summary model from other "unit" models. You may summarize up to seven levels of models with each model on each level having up to 30 sub-models.

* Named Areas, Sort Command, Text Locate, built in Math and Business functions, many Formatting attributes, and more.

Time Management

The Open Access Time Manager provides you with an assistant to help you or your secretary to efficiently organize your engagements. The Time Manager enables you to enter individual appointment records and then List them on a day-at-a-glance screen. The Time Manager will warn you of schedule conflicts when you try to enter an overlapping appointment, but if you give the "ok", it will allow you to overlap them.

Selected Features Include:

- * Scratch pad monthly calendar for miscellaneous notes.
- * Rotary phone and address card file for easy reference.
- * Automatic Appointment lets you enter multiple ap-

Word Processing

Word Processing in Open Access provides you with a complete text editing and text formatting system. Text may be easily typed in and then edited as necessary. Once your document is in the proper form, you may print it out with a wide variety of text formatting options. And don't forget - information from the Spreadsheet or Information Manager may be easily incorporated into Word Processing documents.

Selected Features Include:

- * Block margining and justification with proportional spacing for a neat, professional appearance.
- * Copy text from another file while viewing both the original file and the file from which you are copying.

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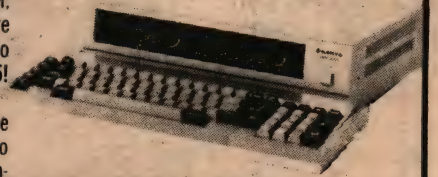
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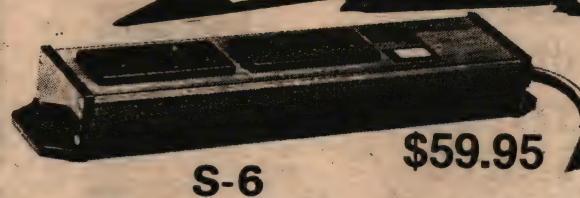
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Open Access
Continued from page 45
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may operate in any one of three modes: micro to micro to allow for file transfers, etc.; micro to subscription network; and micro to mini or main-frame as a dumb terminal emulator.

- Selected Features Include:
- * May operate over any of three media: serial cable, acoustic modem, or intelligent modem.
 - * May keep a file of phone numbers on line for auto

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For more information about Open Access, contact: Software Products International, Inc. 10240 Sorrento Valley Road, San Diego, CA 92121 or call (619)450-1526.

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Co-Processor Board From Morrow Lets Users Run 16-Bit Software on 8-Bit System

A new 16-bit co-processor add-on board from Morrow lets users of the firm's CP/M(R) 2.2-based Micro Decision business/personal computers run software written for the CP/M-86 and MS-DOS(R) operating systems.

The 8088-based co-processor board, which plugs directly in-

to the floppy-disk MD3 or hard-disk MD11, comes in two versions: a 128K-byte RAM version is priced at \$550; a 256K version sells for \$700, or \$500 if purchased with a complete MD3 or MD11 system. Both versions come with the SuperCalc 2 electronic spreadsheet software and will be available in first quarter 1984.

Morrow's 8088 co-processor, developed by SWP, Inc., Arlington, TX, consists of two hardware elements, a main processor board and a Z80 adapter board, MS-DOS and CP/M-86 operating systems, and the SuperCalc 2 electronic spreadsheet.

A major advantage of the MD3's co-processor upgrade is the ability -- made possible by more extensive memory -- to use large spreadsheets such as SuperCalc. Users running SuperCalc under CP/M 2.2 on

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Continued on page 47

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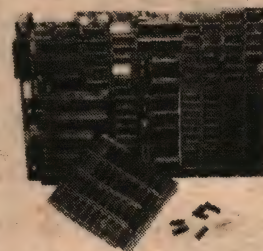
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Co-Processor Board Continued from page 46

8-bit Morrow computers had only 29K bytes of memory to construct a spreadsheet--far too little for many applications. With CP/M-86, the user has 215K of memory -- enough for almost any project.

Simple commands move system control between CP/M 2.2 and CP/M-86 or MS-DOS. Because the CP/M-86 operating system is a file on a CP/M 2.2 disk, the user need only boot the computer up with CP/M 2.2, then type one command to enter CP/M-86. The two operating systems are compatible, making it possible to store files for either system on the same disk.

The MS-DOS operating system is also entered after the computer is booted with CP/M 2.2. After entering a simple command, the user simply inserts an MS-DOS disk in the computer.

In a related move, Morrow has added 16-bit capability to its Decision 1 product line. The D150, a single-user 10-megabyte hard-disk system complete with six software packages, is available for \$5,995.

The MD3, part of Morrow's Micro Decision line of business/personal computers, includes a full-featured terminal with keyboard, two double-sided 5.25-inch floppy disk drives, and seven software packages: CP/M 2.2 operating system, MicroSoft(R) Basic 80, word processing, financial spreadsheet, Correct-It(tm) spelling checker, Personal PEARL(tm) database manager and the Quest Bookkeeper System(C). The system sells for \$1,899.

For further information contact John Seamster, Morrow, 600 McCormick Street, San Leandro, CA 94577 or call (415)430-1970.

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Continued on page 48

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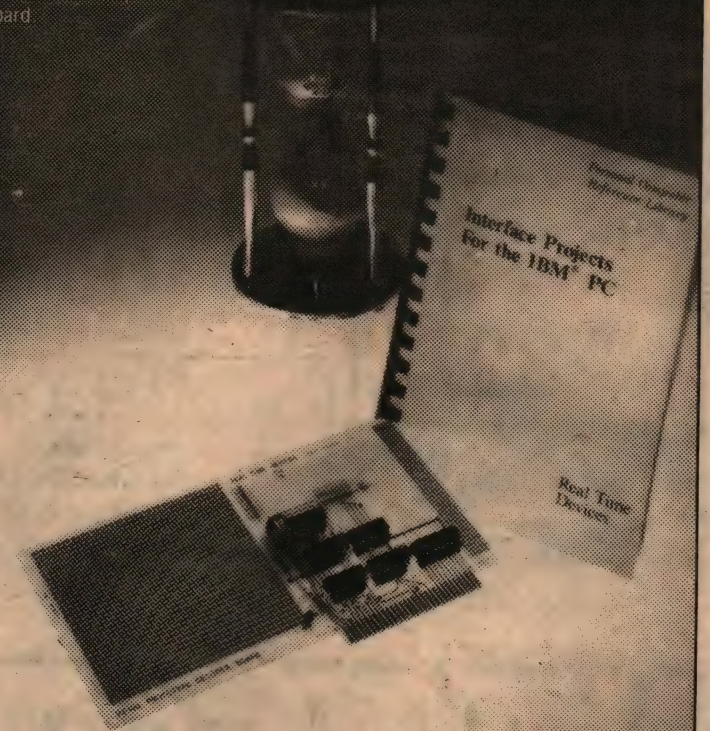
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New PC/8088
Continued from page 47

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Each filecard can hold as much as 8K of information (equivalent to four full screens). This information can be entered manually (typed in), using the powerful editing features of the word processing element (which is also active when in the cardfile), or "imported" from other software. The Idea Processor can save screen images from such popular spreadsheet and graphic software packages as Lotus 1-2-3(tm), Chartman(tm), VisiTrend(R) and dGraph(tm); these charts and images can also be embellished with titles or text using the built in editor. And IdeaWare plans to publish (and encourage third parties to publish) prepared files, with keys already in place.

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The system includes a special program that allows the

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can now retrieve and show these graphs as part of a programmed speech or presentation. He may also use the on-screen "sketchpad" capability of The Graftix Idea to add labels, titles, or drawings to these images, and change their colors.

In addition to comprehensive labeling and titling capabilities, The Graftix Idea's sketchpad can draw pictures, flowcharts, and illustrations in bright colors. Built-in commands include Arc, Box, Line (of 9 widths), Circle, and Dot. Areas of the screen (up to a full screen in size) may be erased, copied, moved, saved into a library of images, and moved between one picture and another. Color options include

Continued on page 51

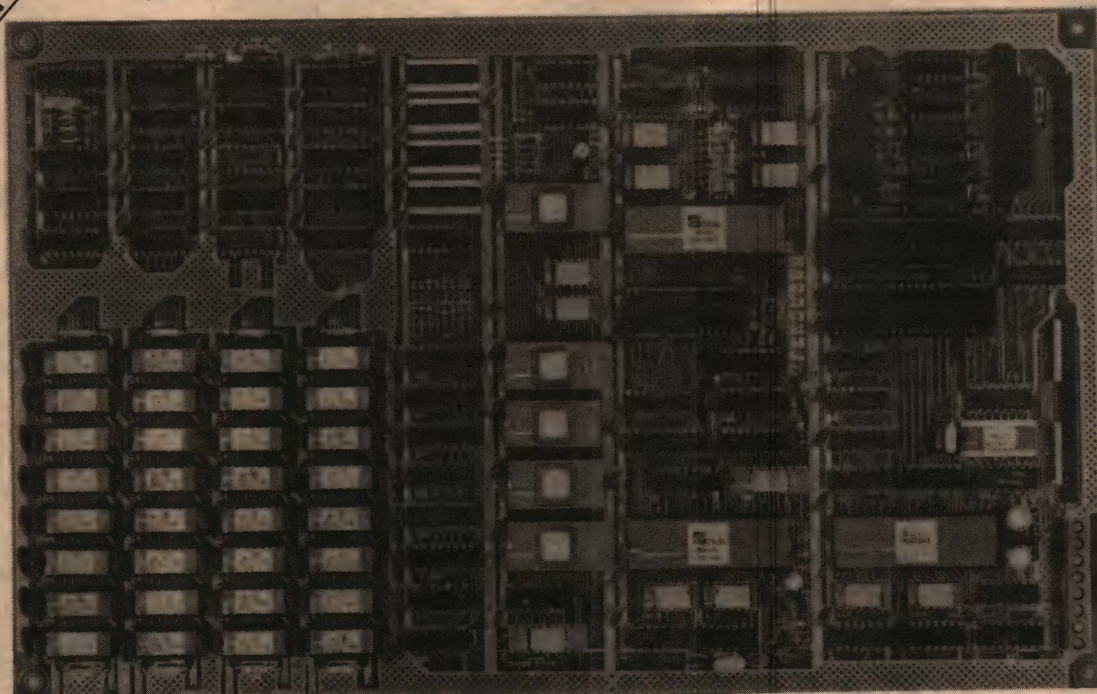
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Software Package Continued from page 50

changing the background color, changing the color of drawn objects, and filling a chosen area with a single color. Text can be put on the screen in three sizes, eight orientations, and numerous colors. Special effects such as shadowed or outlined text are easy to achieve. The drawing capabilities are controlled by cursor movements managed from the keyboard, and require no additional tablets or "mice".

Little learning is necessary for the business user to become proficient with The Grafix Idea, because full on-screen Help is always available. The simplicity and power of the sketch and slideshow programs is expected to extend the system's users beyond the business world into high schools, elementary schools, and even to nursery schools, where it can serve as a fun and simple introduction to exten-

sive graphics power even for young children.

The Grafix Idea may be used in conjunction with the Idea Processor, a powerful system for text editing, word processing, and database management of text and graphics. When the two systems are used together, they make possible the editing of both text and graphics images from within a single program environment.

The Grafix Idea is a product of Idea Ware, Inc., 225 Lafayette St., New York, NY 10012. Suggested retail price is \$79.95, and is available from selected dealers or (for a limited time) direct from the manufacturer.

For additional information, contact Eric Mintz at Idea Ware, Inc., 225 Lafayette St., New York, NY 10012; (212)334-8043. In the continental United States, call toll free (800)221-7798 except in New York State.

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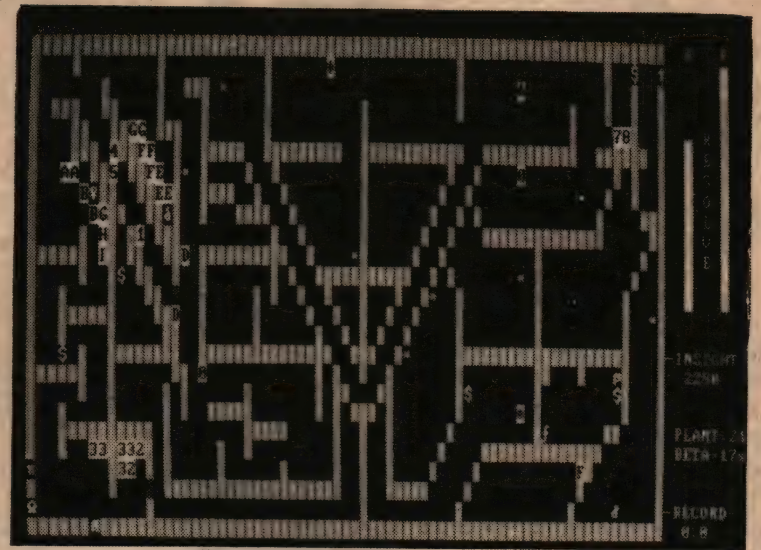


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Persuasion Game For Monochrome Displays

Olorin Games has announced the release of "Persuasion", the first high quality action game that will run on monochrome displays on the IBM PC family of computers. "Persuasion" combines exciting, split-second action with a breadth of tactical and strategic subtlety unmatched in the field of real-time games.

"Persuasion" is not a simple shoot-em-up game, it is not about killing or destroying things, and it does not limit you to eating dots or chasing aardvarks. The game of "Persuasion" provides a wide varie-



Persuasion Game For IBM PC.

Continued on page 52

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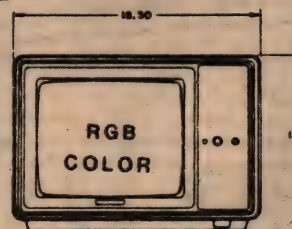
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ECM 1302-3	13" RGB Monitor, High Resolution (Compatible with IBM-PC w/cable)	\$757.	\$399.

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Persuasion Game Continued from page 51

ty of situations and challenges, which make it exciting for the seasoned player as well as the novice.

"Persuasion" has animated fast-action graphics. It also features multiple difficulty levels, variable speed settings, a large variety of screens, a two-player option, a freeze command, a command to toggle sound at any time, high score records in four categories, the option of playing with keyboard or joysticks, operation on monochrome or color displays, and ten game save slots. It runs optimally on any computer in the IBM PC family; requiring only 64K of memory and one diskette drive.

For further information contact Olorin PC Games Masters, P.O. Box 719, Amherst, MA 01004 or call (413)549-4786.

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Active Trace For Basica

Active Trace, is a unique debugging and learning tool for BASIC and BASICA on the IBM-PC and almost any other version of Microsoft Basic running under CP/M or MS-DOS. Active Trace lets you see inside your program as it runs. Automatically, any or all variables (and functions) are followed and displayed, along with their current value and line number, on the screen, printer, or disk. There is no

need to manually single-step. The disk file, a complete, chronological "histogram" of the Basic programs activity, will combine with a word processor to automatically find the source of an error and display the circumstances surrounding its occurrence. If you like, you can scroll backwards through your programs activity. In addition to debugging, it teaches Basic by showing the beginner what Basic does as it does it. To

use Active Trace, just precede your normal loading sequence with Scope, as in A>Scope Basica Myprog (optional dialogue). Like many other Basic utility packages, Active Trace provides complete cross-reference (xref) mapping facilities. Particularly useful among Active Trace's xref features is disk output of the xref map so that it can be edited and annotated in a word processor.

The complete Active Trace package retails for \$79.95. Scope is available separately for \$49.95. To order or request information, call 800-358-9120. In California call 800-862-4948. The same numbers are available for technical assistance, or write Awareco Active Software, 38401 S. Highway One, P.O. Box 695, Gualala, CA 95445. Mention that you read it in Computer Shopper. ●

Time And Billing Templates For Lotus 1-2-3

Two newly-introduced 1-2-3 templates are tapping and expanding the power of Lotus' acclaimed software. Through extensive use of keyboard macros, a 1-2-3 feature allowing single keystrokes to store long sequences of commands, Professional Software Technology (PST) has replaced hundreds of commands with under 20.

Dubbed, "Easier Than 1-2-3," the two applications, Personal Tax Preparer, and Time and Billing, are designed to run wherever 1-2-3, Release 1A, does. Any computer with 256K or more memory which supports 1-2-3 can operate the 2 disk floppy or hard disk versions of each program.

The Personal Tax Preparer condenses 1-2-3 to seven single-

letter commands. Save, Print and Destroy are the only fundamentals to prepare the 1040 and Schedule A, B, C, D, E, G, SE, W, 2106 (Employee Business Expense) and -5695 (Energy Credit).

Numbers are entered only once. Linking, a step beyond 1-2-3, automatically carries the number to appropriate locations on supporting schedules and conversely back to the 1040 from schedules. A convenient list displays for each taxpayer all the forms and schedules in use.

Another automatic feature is the program's internal tax table. The program applies the appropriate tax table or schedule and calculates the tax automatically. Books or look-up tables are not needed. Personal Tax Preparer will print

directly on government forms and on blank paper for computer-generated forms. The 1040 form may not be substituted according to federal guidelines.

Time and Billing uses simple associations for its single-letter commands. For example, Z zaps an account, erasing the record in memory; S gets the user to the start of the account; P enters full or partial payment of a bill under the cursor.

Approximately twenty-five different people, each with different billing rates, can be accommodated on each disk. A total of 10,000 cases or clients can be maintained, each with as many as 2,000 billing entries. That computes to a total of 20 million unbilled current items. The limiting factor is the disk capacity.

PST has used the visual clues spreadsheets offer advantageously. Time and Billing shows numbers being entered, calculations as they are made, and Inter-relationships to other entries or the bottom line.

Time and Billing is designed to be a self-teacher of estimating skill. It is advised that a target fee be entered as each new case is opened, whether a ceiling applies or not. Then, as actual billing entries are made, a comparative basis exists. A past case or project can be referenced as similar future activities arise.

While it presents suggestions, Time and Billing will work with any system of keeping time slips. Users may customize up to 30 abbreviated service codes to minimize typing of billing entry service descriptions. A series of 15 shorthand codes (TC-Telephone Conference) are furnished on the disk.

1-2-3's calendar/clock monitors receivables and shows the aging of all accounts. This is stored in the client information window, making the screen image a handy print out for weekly review, or a client log book.

Knowledge of 1-2-3 is not a criterion for Time and Billing or Personal Tax Preparer developed by Professional Software Technology. Both products will retail for \$175, and was made available on January 1, 1984.

Inquiries and orders may be made by contacting Professional Software Technology, P.O. Box 269, Rockport, MA 01966 or call (617)546-3494.

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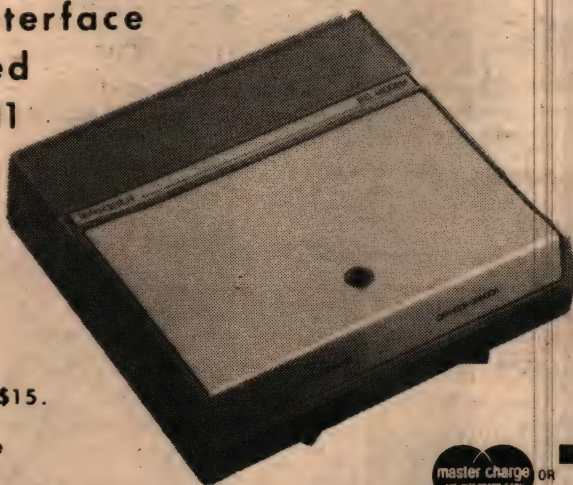
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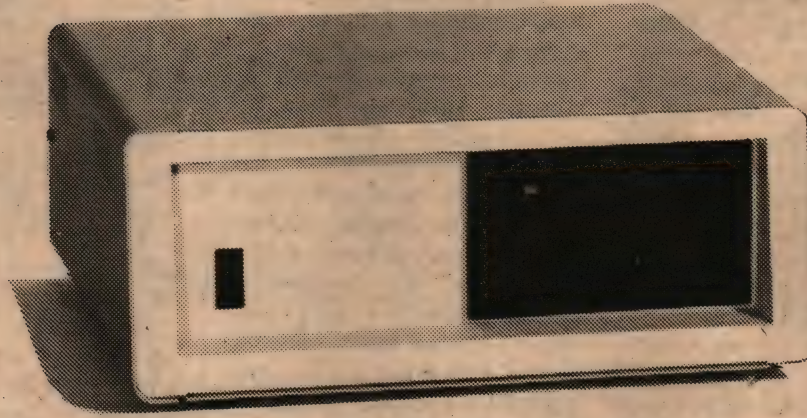


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Software For The Visually Handicapped For The PCjr

Solutions By Example, Inc. and Mark Enterprises, respectively the publisher and developer of PC SPEAK(tm), announce PC SPEAK jr(tm), a product which provides visually handicapped users with an audio display replacement for the IBM PCjr. PC SPEAK jr. and a speech synthesizer replace the display for the blind user. This product will provide many of the capabilities available in PC SPEAK for the regular PC but at a lower cost.

This product will work on a

PCjr. with a disk drive, the built in serial adapter, DOS and a speech synthesizer such as a Votrax Type-N-Talk(tm). The product will also work with an optional parallel printer adapter. PC Speak jr. can be used with programming languages such as Basic, word processors, check book and home accounting packages, list management software, text adventure games and numerous other products.

PC Speak jr. can say what is sent to the display or can be used to review the display much

the same way a sighted person scans a screen. The visually handicapped user can select words or lines to be pronounced or spelled. Input typed by the user is echoed by the synthesizer and can later be reviewed. Users can supply additional pronunciations for punctuation marks and special symbols not usually supplied by less expensive synthesizers.

PC Speak jr. provides the same facilities in a home computer supplied by PC SPEAK on the more powerful PC. The product has been simplified for home users but the important features found in PC SPEAK are still there. The product will work with a PCjr. without purchasing additional hardware other than a synthesizer. This makes the cost for a visually handicapped person no higher than for a sighted person who must buy a display.

PC Speak Jr. is available for \$149 from Solutions By Example at Box 307, New Town Branch, Boston, MA 02258, or (617)244-5880.

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Timeworks Announces Four New Software Packages For IBM-PC

Timeworks, Inc., has announced the first of its series of software programs for the IBM-PC and PC compatible personal computers. The first four programs are Money Manager*, Electronic Checkbook* and Data Manager 2* for home and small business management, and Wall Street*, a competitive game of financial speculation.

The Money Manager is a home and small business budget and cash flow system. Sixteen Budget and Actual categories can be inputted on a monthly basis for a 12 month period. Full analysis is provided including budget and actual comparisons, and detail by individual items. Bar charts provide graphic representation of budget and actual amounts for each period.

Information can be easily stored on tape for later revision or reference. At year-end, after making a copy of your budget, a push of a button sets up another year of saving potential.

The Money Manager interfaces with Timeworks' Electronic Checkbook program. Actual expenditures can be transferred to the Money Manager through a computer. Money Manager retails for \$59.95.

The Electronic Checkbook is a check recording, sorting and balancing system. It organizes and records checkbook transactions on the IBM-PC. Information it can record includes: check or deposit number, description or comment, date, classification code (groceries, entertainment, and so on) and amount. The computer automatically computes checkbook balances. Transactions are sorted and recalled in a variety of ways including by date, by description and by classification.

Additionally, Timeworks' exclusive "X-SEARCH" feature lets you easily cross-search any of the above categories. It produces the sum and average

amounts by indexed categories. The Electronic Checkbook also interfaces with Timeworks' Money Manager program, so that actual expenditures can be transferred directly to the Money Manager Budget program through your computer. Electronic Checkbook retails for \$69.95.

Data Manager 2 is a menu-driven program that easily lets you store information on a wide variety of subjects - anything from general name and address lists, to mailing lists, to research data. This program also calculates and stores any corresponding numerical data.

Timeworks' exclusive X-Search*, X-Sort*, and X-Chart* features allow you to easily cross-search any of the above categories. It stores items in increasing or decreasing order, alphabetically, numerically or chronologically (by date). You can break down statistical information by up to ten indexed categories - and graphically display the results. Automatic calculation of your stored mathematical data allows for payroll calculations, cost estimates, and so on. Data Manager 2 also produces the Sum, Average and Standard Deviation of statistical data entered into the system, along with the Frequency Charts. Data Manager 2 retails for \$89.95.

Wall Street is a competitive game of financial speculation based on realistic financial models for one to four players. No special investment knowledge is required.

Players speculate in stock, real estate, precious metals, minerals and high risk/high return ventures. You have \$1 million to invest that will put you on Easy Street -- or in the Poorhouse. If your cash is running low, your banker or another player may give you a loan, but the interest rates may be very high. A Financial Advisor is available, but he is not always right, and he is expensive. Wall Street retails for \$39.95.

Timeworks markets a broad range of Entertainment, Education, Home Management, Computer Education, and Business Systems for the Commodore 64 and IBM-PC and PC compatible computers.

For complete information or a free catalog, write or call Timeworks, Inc., P.O. Box 321, Deerfield, IL 60015 or call (312)291-9200.

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Payroll Of Pearlsoft's New Accounting Pearl(tm) Released

Pearlsoft Division, Relational Systems International Corporation now offers flexible payroll processing to meet nearly any business need, including many specialized calculations for wage or salary employees, in one element of a new integrated accounting software system for the IBM PC(R). Accounting Pearl (tm) (with general ledger, accounts receivable, accounts payable, payroll and inventory elements) is available for \$895 (suggested US resale) at participating Pearlsoft dealers.

Calculations for hourly employees include overtime, double-time, sick leave, vacation and two "user's choice" pay methods. Payroll calculations for salaried employees are equally easy, and flexible enough to accommodate such specialized needs as commission and bonus payments and deductions for special elective participation programs. Processing can be for any specified period.

The payroll element, like all Accounting Pearl elements, requires only two basic tasks: information entry and report printing. And like the other elements, it asks a minimum of data entry to yield robust results.

The payroll element's nine reports and forms are based on entries to four files. An employee file stores personal and job-related employee information. A timesheet file is used in payroll calculations. A deductions file sets up withholding for tax and up to eight other items (insurance, medical, charitable contributions, etc.) An accumulation file totals gross pay, federal and state withholding, FICA and worker's compensation for each employee.

A Distribution Report details each employee's payroll data. A Check Register Report reflects all payroll checks written. A Deduction Worksheet details deductions for the last pay period to help determine withholding for the current period. An Accumulation Report profiles total payroll accumulations for each employee. An Employee Roster lists employee personal and job-related information. A Distribution Summary Report summarizes payroll for a given pay period. A Quarterly Earnings Report prints a summary of quarterly and year-to-date earnings and taxes for each employee. Payroll also prints payroll checks and employee labels for mailings and internal file folders.

Accounting Pearl readily adapts to specialized needs by providing an easy avenue for preparing custom on-screen forms and printed reports: it links with Pearlsoft's popular Personal Pearl(tm) database management system. Data files themselves can be modified, new fields (items of information) can be added, on-screen forms can be created or altered, and printed report formats can be created, changed or made to link with any of several popular spreadsheet and word processing packages, including SuperCalc(R) and WordStar(R).

Accounting Pearl's general ledger element follows standard double-entry accounting practices. It posts entries from other modules to prepare financial statements. This posting is automatic (no manual steps necessary); recurring expenses (like prepaid insurance) are also automatically entered. The ledger includes a standard chart of accounts (easily customized) and preformatted financial statements (Income Statement and Balance Sheet).

The accounts payable module prepares checks on selected pay dates, which can be established and changed as needed. Accounting Pearl helps decide when to pay invoices by providing a report that forecasts cash requirements by date. It also includes a check register for reconciliation.

Accounts receivable processes invoices, cash receipts, credit memos and adjustments. It prepares statements and

management reports on demand plus a delinquency report to identify each customer's account status. If appropriate, it also calculates interest due on past due invoices.

The inventory module provides immediate information on the stock level of any item. It produces reports for reorder, stock status, sales by item, sales by product class, history by item and history by type. Inventory posting can be done in real time (when the transaction occurs) or batch (all at once).

Minimum IBM PC system requirements are 128K RAM, two drives and printer.

For additional information, contact Pearlsoft Division, Relational Systems International Corporation, 25195 Southwest Parkway, Wilsonville, OR 97070 or call (503)682-3636.

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Medical Program For IBM-PCJr.

CMA Micro Computer has announced the release of a new medical applications software package for the IBM PCjr. computer. The package is called MediCard Jr. and is designed to aid small medical offices with their private patient billing and insurance claim form preparation. The system was written for hospital based surgical practices or office based practices having small billing needs.

The current trends in the medical profession continue to increase the number of medical practices which have to file direct claim forms for services rendered. New regulations, for example, now require hospital based practices to bill directly for their services rather than allowing their fees to be billed as part of the hospital bills.

Increased coverage for drug dependency and psychological disorders have increased the

number of practices which must prepare claim forms for their patients. Recent changes in group policy structures permitting a patient "stop loss" on larger claims make physician claim filing more frequent. The MediCard Jr. package allows offices with these types of needs to have a system without the need for a more expensive computer.

The MediCard Jr. package is designed for a 128K IBM PC Jr. computer and an 80-column dot matrix printer. Analysis requires VisiCalc 1.1. The package is available from over 1,200 CMA Dealers worldwide for \$359.95. Versions of MediCard are also available for the Apple II, Apple III, Lisa and IBM Personal Computer. Additional information and dealer locations are available from CMA Micro Computer, 55722 Santa Fe Trail, Yucca Valley, CA 92284 or call (619)365-9718.

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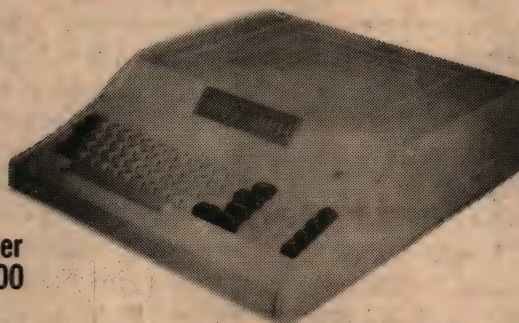
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New 32-Bit Networked Microcomputers Offer Powerful Capabilities For Engineers

Syte Information Technology, Inc., has announced a new line of powerful 32-bit networked engineering supermicrocomputer systems that use multiple microprocessor technology. Called the Syte Series 3000 Micromainframe, the product line offers the processing power of a mainframe in a system designed to fit on a desk.

The Series 3000 proprietary software allows the supermicrocomputers to run multi-

ple operating systems on the same processor at the same time, believed to be an industry first.

There has been much speculation in the press lately about 32-bit microcomputers replacing mainframes and superminis. Syte thinks that this will be the case. And they intend to prove that multiple, tightly coupled microcomputers with state-of-the-art software technology are superior in performance and

price to superminis like the VAX 11/750 and the Vax 11/780 and low-end mainframes like the IBM 4300 series.

Each model in the 3000 series can perform the rapid floating-point calculations required by engineers for computer-aided engineering and design, yet is versatile and easy enough to use for word processing, data processing and other applications that engineers also need. General

purpose computing or work station configurations are immediately available.

The power and ease-of-use of the Series 3000 line results in part from Syte's proprietary Global Environment Manager (GEM) system software. This software allows many operating systems to be used concurrently anywhere within the network--even at the same CPU--thus permitting the simultaneous use of application software written for different

operating systems. GEM creates a "virtual environment," giving each user immediate access to the computing power of other stations as well as to all other resources on the network, including peripherals.

The Syte Series 3000 proprietary multiple microprocessor hardware provides many performance enhancements. In an engineering environment users can program floating-point calculations as fast as they could on a VAX 11/750 computer. Fast and efficient paging is provided by at least recently using paging algorithm that is augmented by a hardware page-frame table.

Syte released the first of the 3000 series, the Model 300, in late January 1984. The product can be used for a number of engineering oriented applications--from software development and computer-aided engineering and design to project management, word processing, drafting and inventory control.

GEM Software-

The GEM software permits the simultaneous use of different programs running on separate operating systems, with multiple windows displayed on the screen.

The proprietary window management software in the 3000 series allows vector graphics, bit-mapped graphics and interactive alphanumeric text within an unlimited number of windows on the display screen. For example, a user can write documentation

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Continued on page 60

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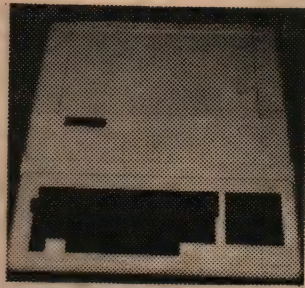
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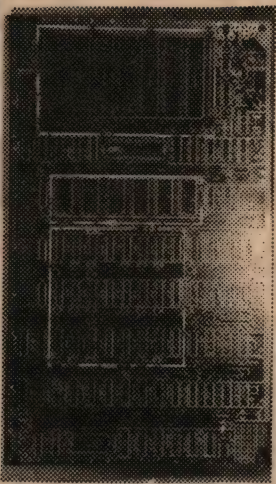
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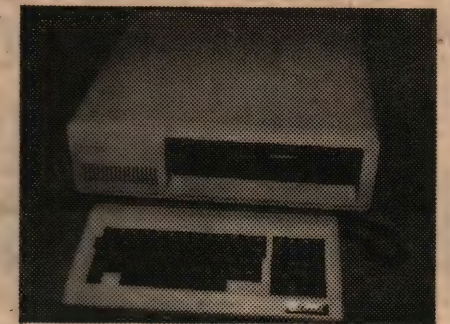
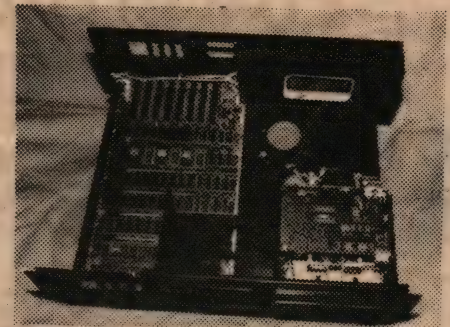
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New 32-Bit Continued from page 58

in one window for a printed-circuit-board layout displayed in another—even if the software for each application runs on different operating systems or

programs by simply moving a "mouse" or another pointing device into the window of interest.

The power of the software lies with GEM's object-oriented architecture, which provides a uniform interface to

all the diverse network resources, be they data, peripherals, files or operating systems. It also allows system software changes or additions to be easily incorporated, and allows files and information to be shared between operating systems.

GEM also ensures software transportability among all the Series 3000 models as well as future Syte computers.

Syte's implementation of the Unix standard, AT&T System V, is called /syte/UNIX. It is available for the system, as are the Fortran, Pascal and C languages. Syte is committed to supporting future AT&T releases, and the latest updates of Berkeley Unix will soon be added. An additional operating system should have

been released by the end of January, with more operating systems to be released during the next 8 months.

Syte/UNIX provides substantial performance improvements over standard AT&T Unix System V through the use of demand paging, preemptive scheduling and a fast forking algorithm. A single system call allows full access to the GEM object mechanism, giving /syte/UNIX full access to all resources in the system, even non-Unix-based file systems.

Model 300 Hardware-

The Model 300 consists of a central-processing unit (CPU) with 1 megabyte of memory, expandable to 15 megabytes; a keyboard and a 19-inch monitor in either monochrome or color. The monochrome monitor comes with high-resolution graphics (1024 by 800 pixels); the color monitor has medium resolution (640 by 480 by 4) bit-mapped graphics.

Each work station in the Series 3000 is equipped with a National Semi-conductor NS 16000 series microprocessor and Ethernet network capability. The NS 16000 family is considered by the industry to be one of the most advanced of the powerful 32-bit microprocessors. Ethernet, an industry standard local-area network, gives each user full use of the power of the system

as well as access to a number of data bases and the ability to share costly peripherals. Syte intends to continue to use industry standards, such as Ethernet, AT&T Unix and Multibus.

Each CPU is a single board that includes the NS 16032 16/32-bit microprocessor for executing code; an Intel 80186 microprocessor for direct-memory access and network and disk interfacing; and two Intel 8051 microprocessors, one for communications and another for diagnostic processing. Like mainframe computers, each product in the 3000 series offers fast floating-point capability, cache memory and separate processors for diagnostic, communications and high-speed input and output. The engineering/scientific super-microcomputers also offer a Multibus option—making the 3000 series compatible with board-level products for more than 100 vendors.

Configurations-

The Syte Series 3000 can be expanded easily. A stand-alone station can be upgraded to local networking without software modifications, and multiple stations can be hooked together in a distributed network.

The networking facilities

Continued on page 61

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Continued from page 60

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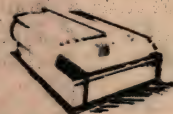


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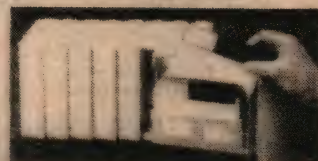
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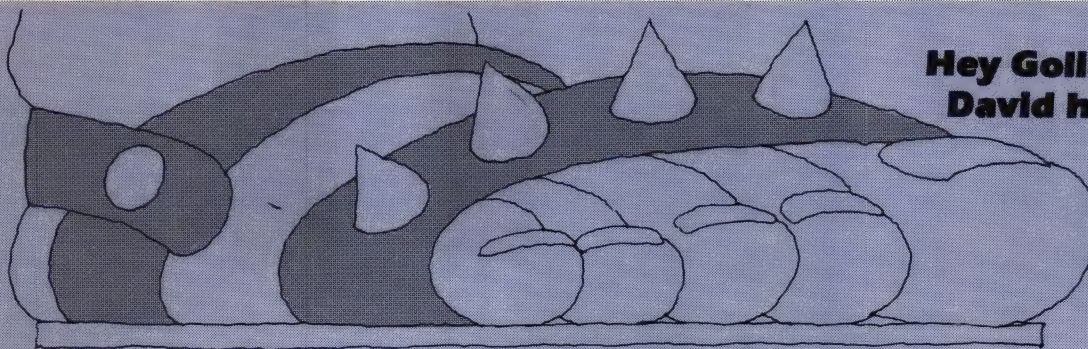
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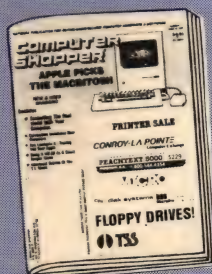


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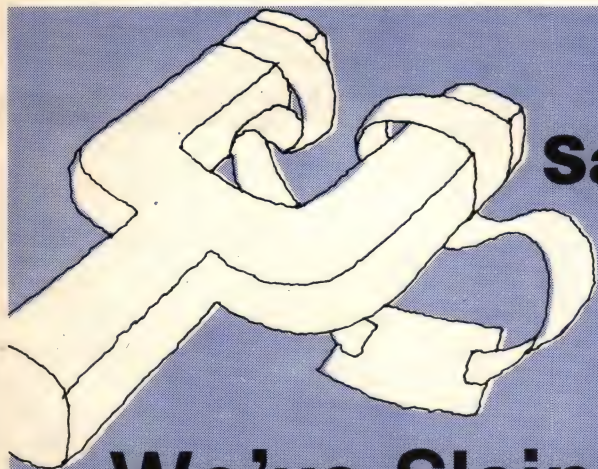
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Inside The VIC-20/Commodore 64

Continued on page 64

Figure 1

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Inside The VIC-20 Continued from page 63

Commodore 64" (available from COMPUTE! Books, P.O. Box 5406, Greensboro, NC 27403 or your local bookstore). Jim Butterfield's "Commodore 64 Video" chapter in the book is helpful if you are looking for additional information on the 6567.

Available Modes

The various display modes of the VIC II are mentioned on page 100 of the Programmer's Guide. The three main modes listed there are:

- Character or "text" display mode.
- Bit-map display mode.
- Sprites.

There are also two special color modes. Let's look at each of these modes separately.

Character Mode

The "normal" operating mode of the VIC II is Character or "Text" mode. It's called Character mode because the screen has 1000 separate character positions on it. When the 64 is first turned on, Screen and Color memory are cleared and Character mode is activated by resetting the VIC II. All other modes have to be turned on separately. Normally, character set definitions are drawn from the Character generator ROM. As we saw last time, by switching character definitions from ROM to RAM, programmable characters are available. This mode, then, is used with normal or programmable character/graphic sets.

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Character mode, by itself, could be used for limited high resolution plotting. Since the VIC I only allowed this mode of display, it is the only "bit-map" mode available on the VIC-20. For full bit mapping of the screen, the 64 has a better method.

Bit-map Mode

The Bit-map mode on the 64 is a completely different mode of display. Bit-map is used for high resolution plotting or drawing. I call the Character mode the "low resolution" mode and Bit-map the "high resolution" mode. The fact is, both modes have equal resolution (320x200) but, this is similar to distinctions made on other computers and clarifies things a little. Bit-map is easier to use than filling the whole screen with programmable characters like the VIC-20 had to do. It also allows the whole screen to be Bit-mapped rather than just a small area. When Bit-map is selected, an 8K chunk of memory is selected that represents the Bit-mapped display. This means all 64000 (320x200) dots or Pixels of the screen are addressable. To turn on Bit-map, we turn on bit 5 of the register at \$D011 (53265). Bit 3 at \$D018 (53272) determines whether the 8K chunk of Bit-map is the upper or lower 8K of the 16K bank that the VIC II can access.

In Bit-map, normal Color RAM is ignored. Instead, Screen memory becomes the Color memory for the Bit-mapped screen. This allows 2 independent colors to be used for the foreground and background of each 8x8 block. Very complex and detailed graphs and pictures may be drawn in this mode. Normally, Character and Bit-map modes may not be used together on a screen. Split screens of high-res graphics with text are possible, however, using raster interrupts.

SPECIAL COLOR MODES

Multi-Color

In either Character or Bit-

map, Multi-color mode may be added. It is similar to the Multi-color mode of the VIC-20. It allows each 8x8 block on the screen to contain up to 4 different colors out of a possible 16. Normally, only 2 of the 16 can be displayed in a single block. This allows fine multi-colored characters and drawings. When this mode is chosen, however, horizontal resolution is cut in half. That means normal characters look funny, and lines on a high resolution drawing are coarser. Instead of 320x200, the screen is now 160x200 dots. This is a trade off between extra resolution for color. This mode will probably be most useful when using programmable characters in a game or animation.

Here is what multi-color looks like with normal characters:

POKE 53270.16

Weird, isn't it? Use RUN-STOP/RESTORE to stop it. If we want to use Multi-color successfully, we have to plan for it. Bit Patterns in the character definition, or the Bit-map memory must take the reduced horizontal resolution into account. Pages 115-119 in the Programmer's Guide give the details.

Extended Background Colors

Since normal text looks rather poor in multi-color, the 6567 allows Character mode to use a special Extended Background Color mode. This is different from Multi-color in that there is no loss of horizontal resolution. There are still 320x200 dots across the screen, but, the background of each 8x8 character block may be one of four colors instead of just the screen color. Normal characters will look fine in this mode. The trade-off is that you are now limited to 64 characters in your set instead of the normal 256. We can fit the upper and lower case letters and ten numerals into 64 characters, but not much else. That's O.K. for most applications. Here is a colorful little program that demonstrates it:

Continued on page 66

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Inside The VIC-20

Continued from page 64

```

10 REM EXTENDED BACKGROUND COLOR DEMO
20 PRINT CHR$(147);
30 SCREEN = 1024
40 :
50 REM PUT CHARACTERS ON SCREEN
60 FOR B= 0 TO 3
70 FOR CH=0 TO 255
80 POKE SCREEN,CH:SCREEN=SCREEN+1
90 NEXT
100 NEXT B
110 :
120 REM TURN ON EXTENDED COLOR MODE
130 POKE53265, PEEK(53265) OR 64

```

```

140 :
150 REM LOAD COLORS INTO REGISTERS
160 FOR REG=53281 TO 53284
170 POKE REG,C
180 FOR T=1 TO 100:NEXT
190 C=C+1
200 NEXT
210 IF C>=15 THEN C=0
220 GOTO 160

```

After you type this in and RUN it, the screen goes blank for a minute. Then up pops the colors! Notice that the character shapes haven't

changed, but the colors sure have! This mode is good if you need multi-color text, but don't want to lose resolution. It will not work with Bit-map, however, only Character mode. Bit-map already allows this kind of extended background so it isn't necessary. Page 120 of the Programmer's Guide goes into more detail. Color keyed characters could be very

useful. You cancel this mode with either RUN/STOP-RESTORE or "POKE 53265, PEEK(53265) AND 191".

Sprites

If the VIC II allowed only the modes we have discussed so far, it would be a very powerful graphics system. It already would have more features than many other computers. The designers of the VIC II, however, added a very powerful and useful mode to the other ones, MOB's (Moveable

however. Everything must come from one 16K bank. Since the 64 has a full 64K of RAM available, it means that the VIC II cannot use all of it, at least not at once. It can only use one of four 16K banks (64/16 = 4) in the 64 at a time. The four banks are numbered 0-3. The bank that is available to the VIC II is selected by the CIR register at \$DD00 (56576). POKEing that register with the number 0-3 will make the proper bank selection. Here is a table of how the selection is made:

Value	#	Pattern	Address	Address
0	3	00	49152	\$C000-FFFF
1	2	01	32768	\$8000-BFFF
2	1	10	16384	\$0400-7FFF
3	0	11	0	\$0000-3FFF

Object Blocks) or Sprites. Sprites are a completely separate display mode, and they can be used along with anything. Character, Bit-map, split screens, whatever, Sprites can be added.

What are Sprites? They are large (24x21 dot) programmable characters that can be moved, modified, collided, prioritized, expanded, shrunk, flashed, and just about anything else. Sprites add a whole new dimension to graphics programming on the 64. I could easily write a book on the subject (and there are books on the subject), but we don't have room for that. Instead, I'll spend a whole article looking at them later.

Memory and The 6567 VIC II

Last time we saw that the VIC II needs to look at three areas of memory to construct a picture on the screen; Screen memory, Color memory and Character memory. If you are using Bit-map, the normal Character memory becomes an 8K Bit-map area. There is a limitation to how much memory the VIC II can access,

Bank #0 is the default bank. If you use bank #0 or #2 the ROM character generator appears in the second 4K block of both banks. You cannot switch it out. If you plan on using programmable characters, you might not want to lose that much memory. That is described in detail on pages 101-106 in the Programmer's Guide.

Which bank you select will depend on how fancy you get with your graphics. Screen RAM is always 1K long. Each Sprite requires 64 bytes. Adding in a full programmable character set is another 2K. If you use Bit-map, you need an 8K chunk of memory for just that, and all of this must come from one 16K block. Screen, and Character, or Bit-map memory locations must not overlap one another or you will get some strange results! Of course, you must make sure that none of it interferes with any BASIC Programs you have in memory. Bank #2 might be a good selection for a BASIC Program using heavy graphics. Just set the VIC II to Bank #2 and set the top of BASIC to 32768 with "POKE 56,128:CLR". If you're using machine language, then make sure there is no overlapping of program and graphics.

Continued on page 68

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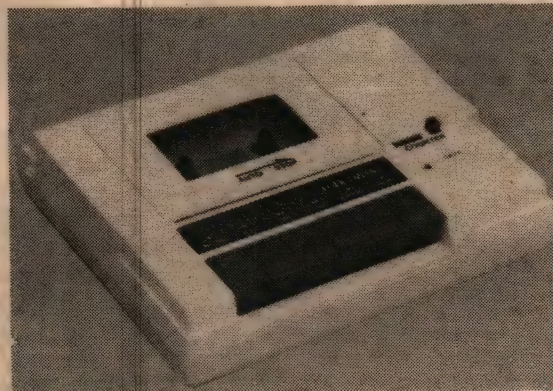
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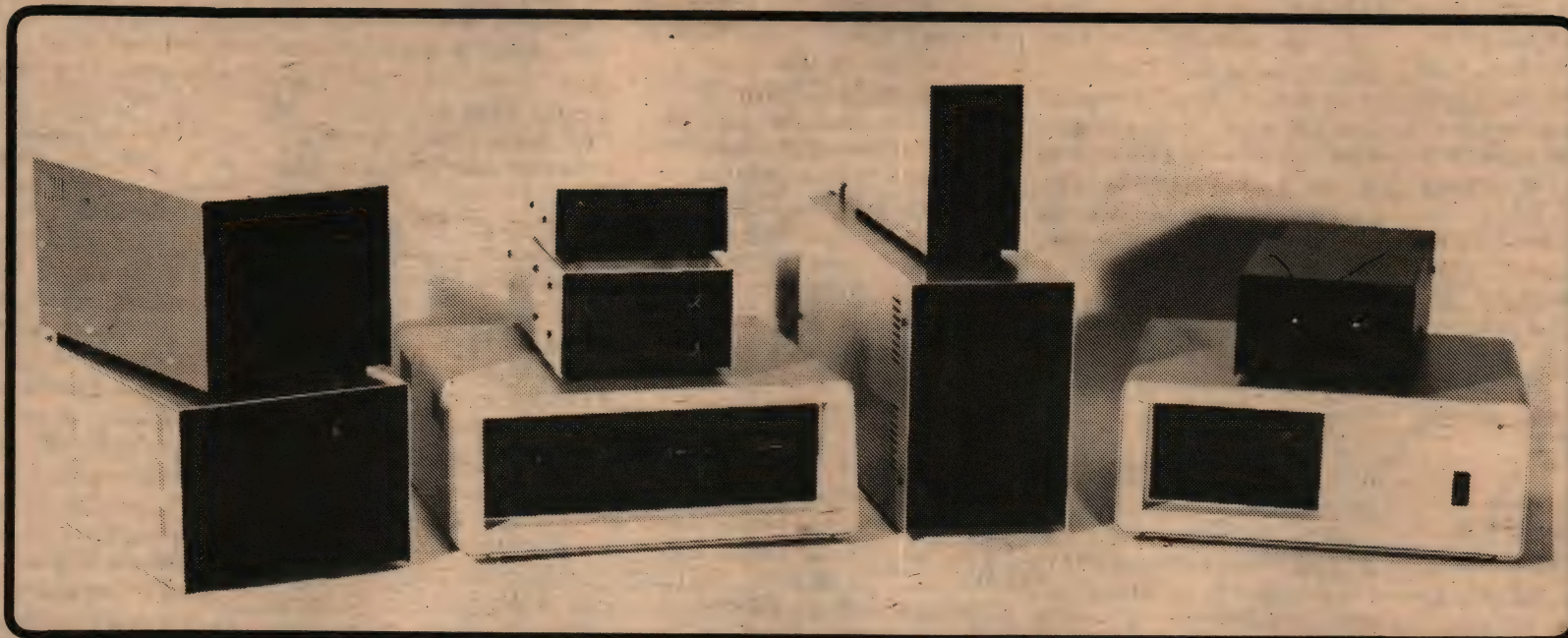
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Inside The VIC-20 Continued from page 66

The register at \$D018 holds the addresses for Screen and Character memory. Pages 102-106 of the Programmer's Guide have the POKE tables for this register. There are some limitations on where we can move our screen and characters to. We can move Screen and Character memory around in the 16K bank, but Color memory is always located at \$D800-DBFF, no matter what. That is O.K. because it doesn't take anything away from our 16K bank. Screen can be moved to the beginning of any 1K block.

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Put another way, we can move it to every fourth page of a bank, beginning at the first page. We can also move Character memory to any 2K block or eighth page. Bit-map must either be the upper 8K of the bank or the lower 8K. Other than that, we are wide open to relocate anywhere there is no conflict with a program or data. Avoid zero page and the stack. You will probably also want to steer clear of the Kernal \$E000-FFFF. Everything else depends on your needs. That's a lot of open space!

We have just touched on the 64's graphics capabilities. The examples here are designed to help you understand some of the basics a little better. In the next few articles we will see how to make a picture on the screen, and then animate it with Sprites. Finally, we will add a little sound from SID to make things more interesting. Stay tuned!

Commodore 64 Software Reviews

by Richard W. Clope

This issue covers reviews of five Commodore 64 arcade games. Many others will be reviewed during the next year. In the beginning, many of these programs will be translations from the original Apple II or Atari versions and reviews may already have appeared elsewhere. This column will at least provide a different point of view and in at least a few cases, a distinct difference of opinion with other reviewer's comments.

Remember, even if you don't have a Commodore 64, read the column. I have some programs that are available for the NEC, the IBM PC, and the TI99/4A, and the TRS-80 col-

or computer as well as the VIC-20, Apple II, and Atari computers. Some of these are even available for home video game units. All of the comments I make apply only to the C64 version of a program. Other versions may lack some features or may have enhanced features. When provided by the vendor, all available computers and formats will be listed along with prices.

I've reviewed possibly 100 TRS-80 arcade games and now I've seen several Commodore 64 games. I use the following categories (each worth 20 points) in my ratings: originality, variety, playability, documentation, and technique. Bugs are assigned negative points. Most of the categories

are self explanatory but a few might be vague. By playability, I mean that a beginning player can score some points soon after starting play. The level of difficulty should escalate at a realistic pace until a level is reached where scoring can be quite difficult. Also included in this category is the impossible to define feature or features which make the player want to keep playing. Documentation is rated on a comparison to current arcade game documentation standards which I consider to be generally not too good. Technique covers the programmer's use of all the tools he has available for a given machine including color, graphics, sound effects and music, etc. If a program appeals to you, any rating over 90 should provide you with a quality program. A rating of less than 90 means I feel the program has some flaws or drawbacks. This does not mean you shouldn't buy the program. If it sounds good to you and the drawbacks are minor, buy it. Important!! always read the summary following the review for any qualifying comments I might make.

After considering all of the programs I've seen, I sometimes dream a little about what I consider the perfect computer arcade game format. I see all games (with some exceptions for practical reasons) being played either from the keyboard or with joysticks. I see all disk versions saving the top twenty scores to disk. I see all programmers using the same joystick port. I see all of the graphics and sound capabilities of the machine being used to the fullest extent. I dream of all games having a pause feature and a good demonstration screen. Most of all, I dream vendors and programmers realize that the object of the game is not to see how fast I spend quarters but

Continued on page 69

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Commodore 64 Reviews Continued from page 68

to provide me a few screens in each game that are relatively easy before making the game so fast and difficult that it becomes frustrating.

I'd also like to see fewer copycat programs and more originality — this is now beginning to happen. What about it, programmers and vendors? Can you make my dreams come true?

SQUISH'EM

Game design - Tony Ngo
Sirius Software, Inc.
10364 Rockingham Drive

Sacramento, CA 95827

Commodore 64 disk — \$34.95

Also available for:

Atari computers - cartridge
VIC-20 - cartridge
Atari 2600 VCS - cartridge
Colecovision - cartridge

Type of program - Climbing type of arcade game. Points are scored by climbing up a 48 story building under construction. There are assorted monsters - one monster on each story. Monsters can be squished for extra points.

This game can effectively be

played either from the keyboard or with joysticks. There is a demo at the beginning of the program but it is ineffectively done. High scores are not recorded to disk. Color and sound are used effectively and the graphics are excellent. A pause game feature is provided. The playability is excellent - it doesn't take long before you can attain a high score but then the game becomes more difficult but at just about the right pace. You keep coming back for more.

The building consists only of floors and a varying number of beams (sometimes only one) connecting the floors. Your climber doesn't stand on the floor but hangs onto the horizontal beams. There is only one monster on each floor.

You will encounter the same funny looking monster for several floors. Then the screen will change color and you'll hear a siren indicating that after a few more stories you will meet up with new and funnier monsters. You cannot touch a monster or your climber will fall. In the beginning the monsters move slowly and predictably. Later they move in a more random pattern but never do move fast. Is the object to destroy the monsters? No - all you do is jump on them and squish'em. After a few seconds, the monster revives and becomes white and unsquishable. As the game progresses, the monsters revive faster.

On one floor of each building, there is a prize in-

stead of a monster. You get an extra man every time you collect a prize. When you get to the top, you pick up a suitcase of money and parachute to ground level and begin climbing up another building. You must also be aware of falling objects. There is some kind of villain throwing all sorts of things at you to try and knock you off the building. You begin with four men and as soon as all of your men have fallen off the building, the game is over. You score 10 points for climbing a floor, 200 points for jumping over a creature, 1000 points for retrieving the suitcase, 300 points for stomping a moving creature, and 100 points for squishing a monster not moving. Jumping over creatures becomes difficult quickly. It's more fun stomping them anyway.

Originality 20
Variety 17
Playability 20
Documentation 17
Technique 20
TOTAL 94

Summary - Excellent arcade game. It's lots of fun to play, the pace is perfect, and the sound, color, and graphics are combined well. Why not enable us to save the high scores to disk?

Fast Eddie

Game design - Mark Turmell
VIC-20 and Commodore 64 versions - Kathy Bradley
Atari computer versions - Tom McWilliams
Sirius Software, Inc.
(Address Above)

Commodore 64 disk - \$34.95

Also available for:
VIC-20 - cartridge
Atari computers - cartridge

Type of program - Cute climbing type of arcade game where you try to avoid creatures called Sneakers. You collect prizes and advance to the next level by stealing the key from High Top.

This game must be played with joysticks. I'd like to have the option of playing from the keyboard, too. The demo at the beginning of the program is good. Color, sound, and graphics are again excellent. The scores cannot be saved to disk. The pause feature is again present and the playability is just right. The game is easy to play in its early stages but becomes increasingly difficult. You can select any of the eight play levels at the beginning of play - a good feature.

You begin play with four Fast Eddies. Bonus Eddies can

Continued on page 70

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Commodore 64 Reviews Continued from page 69

be accumulated but you are limited to three reserves at any time. You gain the bonus man every time you steal the key from High Top. There are five floors. On the top floor is High Top, a tall creature that is all legs. High Top is carrying a

key. You can't jump high enough to get the key until you capture all the prizes. High Top gets shorter every time you get a prize. Sneakers occupy the bottom four floors. The floors are connected by ladders with a different arrangement of ladders for each screen. You can avoid fatal contact with the Sneakers by climbing lad-

ders or jumping over them. Initially, there is one Sneaker per floor and it is dashing back and forth across the entire screen but in a predictable manner. On the lower four floors, prizes float by. You jump up to capture the prize. If a prize floats off the screen, it reappears on the other side. Prizes include hearts, fish,

tanks, balloons, hammers, smiling faces, and a few that I still haven't figured out. The first prize is worth 10 points, the second 20 points, etc. with the last prize being worth 90. By the time you get the last prize on a screen, High Top has become short enough to steal the key.

After awhile, Sneakers ap-

pear in groups and are harder to jump. Then they move in a different pattern and finally you encounter "fat" Sneakers. The game then really gets tough but never in a way that causes you to get tense while playing. I haven't stated it but you're right - you lose an Eddie every time you touch a Sneaker. How can such cute creatures be so dangerous? There are five different screens on each of the eight play levels.

Originality	20
Variety	17
Playability	20
Documentation	17
Technique	10
TOTAL	84

Summary - This is almost an excellent program. There is a major problem, unfortunately. Occasionally for short periods of time, the horizontal movement of Eddie is very erratic and sluggish. He just won't move properly and gets hit by a Sneaker, I have about seven or eight joysticks and the problem occurs with each one. This is either a programming problem or I have a defective disk. If I have a bad disk, I invite the vendor to send me another.

If you have a VIC-20 or Atari computer, you probably will not encounter the problem because I've played the Atari 2600 VCS version and have had no trouble at all. The program is a good one but if you have a Commodore 64 beware of the problem. I'll try to find out from the vendor the cause of the trouble.

Repton

Game Design - Dan Thompson and Andy Kaluzniacki
Atari conversion - Dan Thompson
Sirius Software, Inc.
(Address Above)

Commodore 64 disk - \$39.95

Also available for:

Atari computers - disk
Apple II series - disk

Type of program - Space shoot out type of program. In some respects, this program is like Defender. It's a well designed program and fun to play.

This game may be played from the keyboard or with joysticks. It performs equally well either way. There is a training mode that enables the player to get a feel for how the game plays. A pause feature is available but high scores cannot be saved to disk. Once more playability is excellent. It's easy to wipe out the first few waves of alien ships but becomes increasingly more difficult.

Continued on page 72



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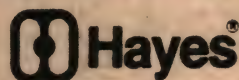
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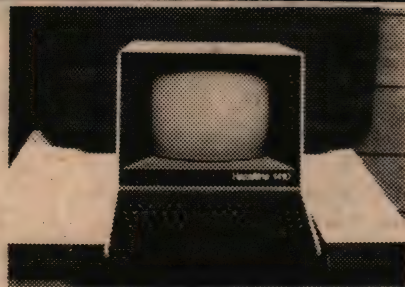
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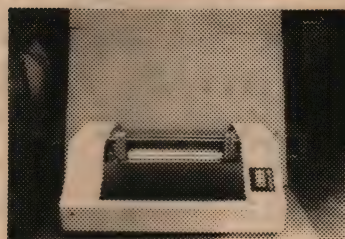


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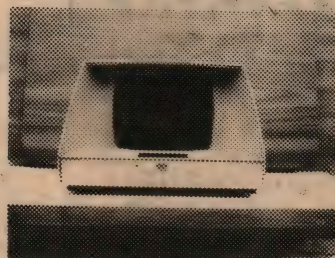
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Commodore 64 Reviews Continued from page 70

Repton is being attacked by aliens and you and your super Armageddon fighter are the last remaining hope of the civilized world. The aliens are constructing a base. Your job is to prevent the base from being built. There are several types of enemy ships. Most of them do not attack but you must avoid colliding with them. The Nova cruiser is worth 150 points when destroyed - when destroyed, however, it breaks into four deadly small single ships worth 100 points a piece. Mine layers score 75 points and you must avoid the mines floating in space. The Spy is not particularly dangerous and is worth only 25 points. Drayns are draining power and you score 75 points for each one destroyed. Dynes are par-

ticularly dangerous and score 100 points when eliminated. The quarriors are the builders which carry parts of the base into position and are worth 60 points.

The Drayns steal power. You are warned this is happening. You race to the spot when you receive the ALERT warning and destroy the Drayn or intercept the beam of power. Dynes flash a deadly beam horizontally across the entire playing field. Quarriors release what seem to be floating mines or missiles. You must also be aware of the missiles that are launched from the ground. Your ship has continuous fire and moves in all four directions. It also has a shield and smart nuke bombs which destroy all enemy craft on the screen when detonated. You gain an extra ship and smart bomb for each 5000 points. If you survive long enough, the

Quarriors will have completed the base. You then must go underground and attempt to destroy the enemy tower.

You have a radar screen displayed at all times showing your position and the location of all enemy ships. This is a big help. My best strategy has been to keep going left or right while bobbing up and down, keeping my weapons continuously firing. Use the shield when necessary and the nuke bombs only when you are overwhelmed by enemy ships. Sound, color and graphics are excellent. The written documentation supplied is sparse but the documentation within the program is excellent.

Originality	18
Variety	18
Playability	20
Documentation	20
Technique	18
TOTAL	94

Summary - This is an excellent program. It's paced well, makes use of the C64's graphics and sound, and is a lot of fun to play. If you enjoy space type shoot outs, you'll like this one.

Turmoil

Game Design - Mark Turmell
VIC-20 and Commodore 64 versions - Jeremy Jones
Atari versions - Tom McWilliams
Sirius Software, Inc.
(Address Above)

Commodore 64 disk - \$34.95

Also available for:

Atari computers - cartridge
VIC-20 - cartridges

Type of program - Very fast moving arcade game. This program will appeal mainly to veteran joystick jockeys and the younger player who still has good hand and eye coordination.

This game can be played from the keyboard or with joysticks. This game can be paused at any time. Scores are

not saved to disk. Sound, color, and graphics are used effectively. For me, the game is a little lacking in playability. I can clear a few screens but I feel the game gets too fast too soon.

There are seven rows across the screen. Moving rapidly across the rows are a variety of enemy ships. Your ship is in the center of the screen and with one exception, you can only move vertically - you cannot move into any of the rows. Your best strategy is to keep moving quickly up and down the rows and shooting in both directions. If you do this fast enough and alternate between shooting left and right, you can avoid colliding with the enemy ships and losing a ship of your own. There are a few complications, however. If you fail to destroy an arrow before it crosses the screen, it turns into a tank. Tanks can only be destroyed from the rear. In addition, prizes can show up in any row at the edge of the screen. You must go down the row (this is the only time you can move down a row) and capture the prize. After you capture a prize, a ghost ship (indestructible, of course) appears where the prize was. It shoots across the screen until it disappears on the other side. You must avoid this row until the ghost ship disappears. If you delay too long before picking up the prize, it turns into a Supersonic Cannon Ball.

The faster an enemy ship moves, the more points it is worth. You begin with five ships and gain a bonus ship for each play level you clear of enemy ships. There are nine play levels including several where the alien traffic lanes

become invisible at times. Each level has more and faster enemy ships. You can elect to begin play at any level and demonstration modes for each level are available.

Originality	20
Variety	18
Playability	16
Documentation	18
Technique	20
TOTAL	92

Summary - OK, for those of you who are real joystick experts and have the necessary reflexes, this is an excellent program. I promise you'll have a real challenge and have a lot of fun. For the rest of us, this game is too fast and frustrating. I don't enjoy it but my son thinks it's great. There's no middle ground on this program - you'll either love it or hate it.

Snake Byte

Game Design - Chuck Sommerville
VIC-20 version - Dan Stanfield
Music and sound effects - Ray Elzey
Sirius Software, Inc.
(Address Above)

Commodore 64 disk - \$33.95

Also available for:

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Type of program - Arcade game where you must maneuver a snake around various obstacles to eat apples. Avoid the perilous purple plums.

This game is playable from

Continued on page 73



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Commodore 64 Reviews Continued from page 72

the keyboard only. It would be impractical to play with joysticks. All of the Commodore 64's features are used to their fullest. The music (snake charmer's music) and sound are great. Games may be paused but scores cannot be saved to disk. The demonstration mode is superb. Just sit back for about 30 minutes and you'll see all 28 of the screens and be amazed at the coiling of the snake and how it moves. Playability is excellent.

You begin each game with three snakes. You gain a snake for each screen cleared. Ten apples will appear on each screen one at a time. Your snake must eat each apple within a given period of time. For each apple eaten, the snake gets a little longer and moves faster. If you do not eat an apple in the allotted time, three penalty apples appear. Once you have consumed all of the apples, a small door appears at the top of the screen. You go through the door and go on to the next screen. You can control the snake with absolute movements (up, down, left, and right) or relative movements. Relative movement uses only two keys to make your snake turn left or right 90 degrees. I used the two key approach. Learning to coil your snake is a must.

Your snake dies if it hits a wall or an obstacle. You can also play with one or two perilous purple plums. These are bouncing randomly around the screen and will kill your snake if they hit the snake in the head. If you lose a snake,

you start play again in the same room and still must eat the original ten apples plus any penalty apples. Each apple is worth 10 points times the current level of play. With one or two plums, you score one and one half or two times the basic points. I said the playability was excellent. It is. I'm a klutz when it comes to many of these arcade games but I've gotten as high as level 13. The obstacles and mazes get very difficult after a while particularly when you've got a long fast moving snake.

Originality.....	18
Variety.....	20
Playability.....	20
Documentation.....	18
Technique.....	20
TOTAL.....	96

Summary - This is a superior program. Everything about it is an example for all computer arcade games. Buy it and have fun but look out for the plums. I have one small reservation. The game cannot be played with a joystick and a few players might be discouraged by needing to use the keyboard.

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Spritemaster 64

by Cheryl Peterson

Spritemaster 64, a program by Access Software, allows users to create and manipulate sprites. By using this program with a joystick, a person can draw a small picture on the screen in up to three colors. This sprite, which consists of a block of pixels 21 x 24 dots in size, can then be viewed, moved around, modified or viewed in sequence with other sprites. The program allows users to view several sprites in sequence with a changeable time delay. This creates a motion picture type simulation allowing you to see how the

sprites could look in action.

The program's main menu features uild, <M>odify, <V>iew, <C>opy, <D>elete, <P>urge, <L>oad, <S>ave, <T>ransfer, <A>nimate. <S>ave and <L>oad are disk functions. <T>ransfer writes the data for a sprite into a file that can be used from BASIC. The rest of the options deal with sprites in memory.

In the uild mode, the sprite is designated as single or multicolor. Once this decision is made it can't be altered, except by starting the sprite over. The colors for the sprite are chosen and assigned to the function keys. A 21 by 24 grid

is then displayed. By using the joystick, you move the cursor around the grid. To "paint" a square, you move out of the square while pressing the fire button. The function keys control the color being used. Function seven is always set to black. The / key puts you back to the main menu.

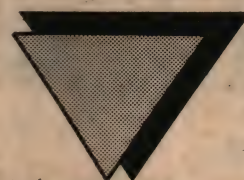
If you change your mind about a sprite after you've left uild mode, you can adjust your creation using the <M>odify option. Joystick around and change the dots you don't like. Again, the / gets you out.

Continued on page 74

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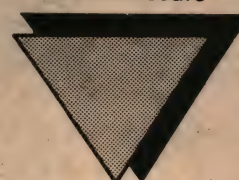
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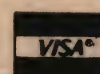
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Spritemaster 64

Continued from page 73

Entering the <A>nimate option lets you designate a string of sprites to display, step through them one at a time or set a delay time and let them display automatically. In automatic, you move the sequencing sprites up, down, left, right or any combination thereof by using the cursor keys. Exiting is by /.

In <V>iew mode, you can look at how three sprites would appear if you had chosen other colors. You can see what they'd look like on the screen together. The background and

border colors can be changed. They can be seen in expanded or compressed versions, horizontally, vertically or both. As in <A>nimate mode, they can be viewed sequentially to see what effects you can achieve.

The other main menu options manipulate sprites in memory. The program designates 16 areas where sprites can be created and stored. The program keeps track of them by their number. Until they are written to disk or tape, they can be adjusted or accidentally lost. Individual sprites can be copied into empty areas or deleted. The <P>urge command wipes out all of the sprites in memory.

<S>ave and <L>oad are self explanatory. <S>ave doesn't ask for a filename because it names by section. <L>oad first determines which section you'd like to put in. A disk holds ten sections.

The error trapping is excellent. All fatal commands are double checked before execution. Improper input is ignored. It won't let you write or copy over an occupied block.

The documentation is very good. The instructions are written in plain English. There's a section that tries to

get the user started putting sprites into their own programs. This isn't entirely adequate for tutoring novices. To get a program running using Spritemaster's data statements requires a lot of programming and more reference than is provided by the manual.

One of the nicest programming features of the Commodore 64 is it's ability to use sprites. These little graphic pictures can be manipulated around the screen without having to rewrite the code for the picture into the video display area each time you wish to show a sprite. Spritemaster 64 does make it easy to create sprites. To do anything with the sprites, however, requires a lot of work. For this reason, I can't recommend this program to novice users, except as a drawing tool.

Intermediate level programmers would find it useful to get them more familiar with sprite design and manipulation. Used with the Programmer's Reference Guide (available in most book stores) it could be worth the price to a programmer.

The program is available on disk or cassette from Access Software, 925 East 900 South, Salt Lake City, UT 84105 for \$39.95.

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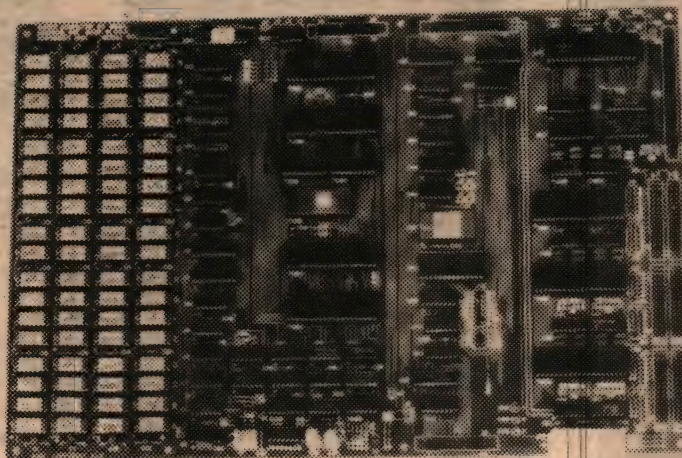
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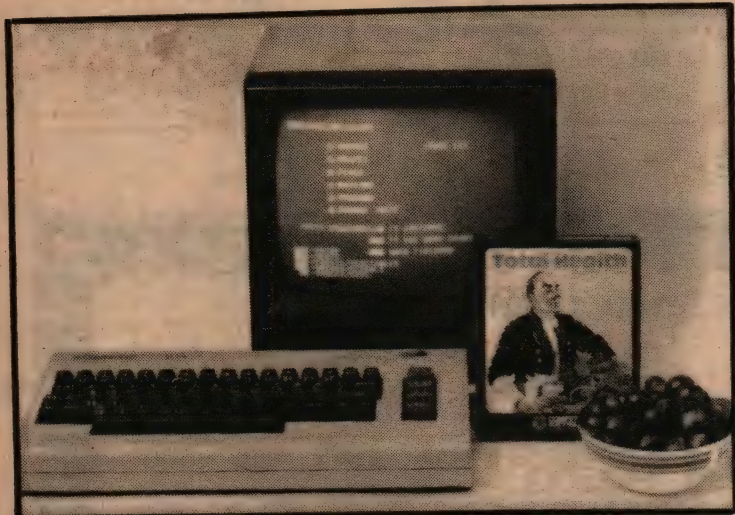
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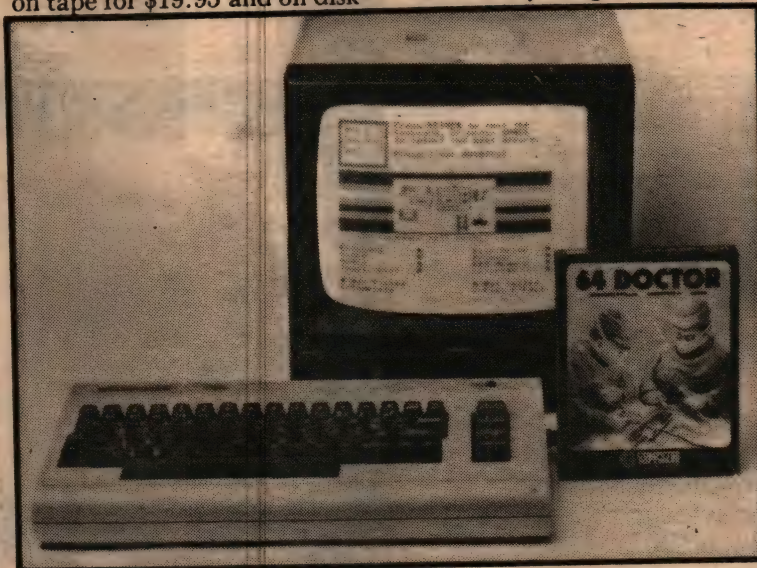
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Innermost Secrets Of The TI 99/4A Part IV

by Randy Holcomb

In part 3 we covered programming the TMS9918A Video Display Processor for the 99/4A. In this installment we will discuss assembly language programming of the TMS9900 microprocessor. We will give a cursory overview of the architecture of the 9900 and give you helpful hints on how to maximize programming efficiency, along with a few tricks here and there. After careful thought, this will not be so much a tutorial but serve as a springboard to point you in the right direction for you to learn assembly language.

Recently, Steve Davis Publishing released a new book for the beginning Language Programmer called Assembly Language Programming For the TI Home Computer, written by Ralph Moelsworth, which is available at better book stores or direct from Steve Davis Publishing. I hope to

have a review of this book in time for next month's issue.

For those of you who assembly language programming is new, some helpful words of advice:

1. Start out small. Take a small BASIC program you wrote (or portion of a program) and try coding it in assembler to get the feel of things. Remember, you are literally telling the computer what function it is to perform. Unlike BASIC, assembly language creates object code that the computer can directly act upon, rather than being interpreted the way BASIC is. If you need to modify the assembly language program you have to change the "source" code (code which can be read by a person) than you must use a program called an assembler which translates the source into "object" code (which the computer can understand.)
2. Take a college course in assembly language programm-

ing. Taking a course gives you the necessary instruction in the fundamentals of computer architecture, plus the fact that most courses take you thru assembly language programming at a reasonable pace. Although the assembler course you take probably won't be dealing with the architecture of the 9900, getting the concepts will allow you to migrate to the 9900 with little problem.

3. Study a listing. With the Editor/Assembler package comes source code for the

debugger and in most cases, the game **Tombstone City**. Assemble both of these programs and get listings. Then take the E/A manual and look at how these programs flow. Both programs are commented quite nicely, and with a little bit of time on your part you can see what it is the program is doing.

4. Work at it. Assembly language is not the kind of thing that comes easy for most people. It takes an awful amount of work to do some

things that were a breeze to do in any other language. But for the aggravation involved the results can be very rewarding. Good assembly code not only is smaller than code generated by

Continued on page 80

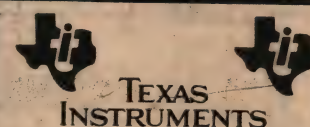
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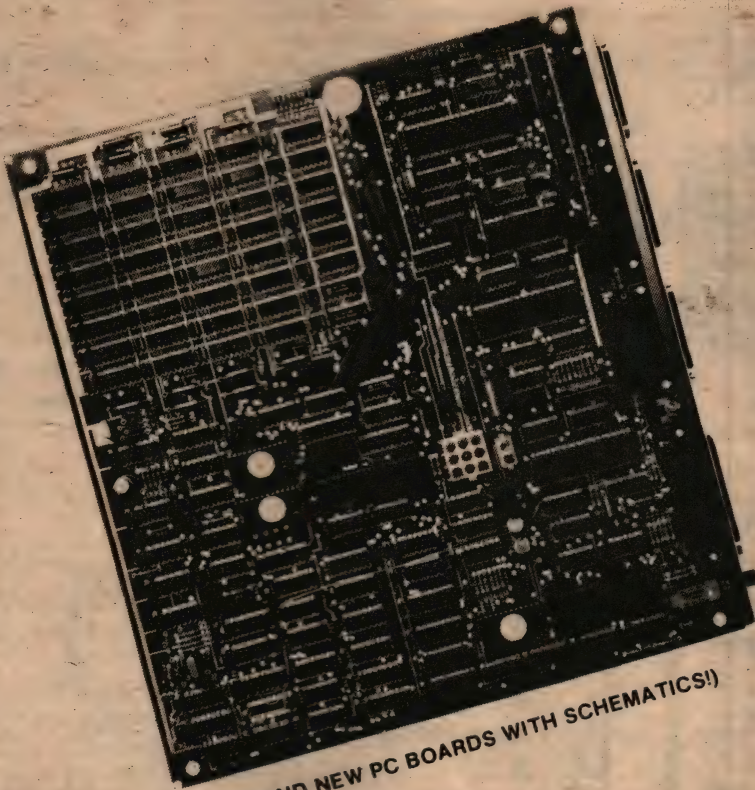
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Innermost Secrets Continued from page 77

compilers but also tends to be much faster as well. On the larger TI minicomputers such as the 990/10, TI Pascal has a program that takes the output of the Pascal compiler and performs what is called a reverse assembly: it shows you the object code the compiler generated to the particular source line. With this information the programmer can further refine the speed of the program by eliminating or rewriting portions of code that

may be redundant or unnecessary.

Although machine language is fast, the 99/4A takes some finagling and some knowledge of how this particular 9900-based system is configured to get the speed up there. First, the memory map. As you remember from the first installment, the base 99/4A console has 8K of System ROM and a 256-byte scratchpad memory internally. This memory is on the 16-bit wide data bus. Why is this significant? Because the rest of the 99/4A's memory is either memory-mapped (VDP,

sound, speech, and GROM) or is on the 8-bit bus (where you expand your system off of.) Machine language code executes the fastest inside the ROM and in scratchpad RAM (if you put code there) because the bus multiplexing logic used by the peripherals is defeated, allowing such code to run full tilt at the system rate of 3 MHz. However, when external devices are accessed (such as disk, a ROM Cartridge or GROM) the Bus multiplexing logic comes into play. This logic slows the machine down by inserting 3 WAIT states to the 9900 microprocessor. Way

back when, memory was slow, and for slow memory to be used with a computer the interface circuitry had to have a way of telling the computer to wait a specific period of time for the memory to present the data for the CPU. In the /4A case, wait states are used to place the data on the TI's 16-bit data bus by latching the most significant byte of the 16-bit word inside the console. The multiplexing circuit generates another 3 wait states to latch the least significant byte. After fetching the least significant byte, the word latched and fed to the processor.

So, you are saying to yourself, "So that's why BASIC is so slow!!" Not quite. Remember the GROM? Well, as it turns out most of BASIC is written in TI's proprietary GPL (Graphics Programming Language). As it turns out reading from a GROM is even slower than from a peripheral IF you are not accessing GROM sequentially (which was the way it was designed--the memory speed of a GROM from address presentation to

Continued on page 81

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availability of data is 2 microseconds). Now comes the kicker-GPL is an interpretive language, just like BASIC. So instead of dealing with one interpreter (BASIC, normally written in machine code) you have BASIC, an interpreter being interpreted by GPL, itself another interpreter!

Well, things aren't quite that bad, some of the more time-critical routines are stashed in ROM (such as floating point routines) and there are a slew of support routines that are at your disposal when you write in assembly language. Most of these routines are described in detail in the Editor/Assembler reference manual.

Once you have become proficient writing assembly-language code, you may want to speed things up a bit. Here are some suggestions on that line:

1. Keep the registers full of often-used data. This is where the TI excels. Because register operations create more compact code (moving a register to a register is just one word; moving a symbolic item to another symbolic item takes 3 words) keeping the registers full of the data you are using the most (like counters, pointers and such) will cut code size down and also increase execution speed as the additional fetches needed to acquire addresses are not needed. Remember to be careful with register 0 (can't be used for indexing), register 11 (the return address from the BL is kept here), register 12 (the base address for CRU instructions) and registers 13, 14 and 15 (the previous workspace, program counter and status registers respectively; stored by BLWP,

interrupt ad XOP instructions.)
2. Keep workspace registers in the scratchpad RAM in the console. Be careful however of not overwriting areas that are used by some of the system routines; especially at >83CO, which is the GPL workspace registers and other areas which may be used by TI BASIC. Pages 404 thru 406 of the Editor/Assembler manual describe the addresses and locations of the scratchpad memory locations in detail.

3. Make use of subroutines. If you got code that is constantly used in a good number of sections of your code, make it a subroutine callable by a BL or BLWP instruction. If you are really creative you might even want to implement a "new" instruction of your own using the XOP command. Back when the 990/10 minicomputer was floating about the XOP was (and still is) used to issue what is termed a SUPERVISOR CALL--requesting that a system service be performed. In the /4A environment most (but not all) consoles allow you to do the same thing by inserting the workspace pointer address at >FFD8 and the program counter at >FFF8 for XOP 1, and >83A0 and >8300 for XOP 2, respectively. (XOP 1 was used by Texas Instruments for software development, and is used by the debugger software for inserting soft breakpoints.)

In some instances, the XOP was used to turn control over to a specialized piece of hardware that took control of the bus, performed its function and returned control back to the computer.

This gives you a rough idea of the world of assembly language of the TI. I omitted giving out code examples for the reason that there are sufficient number of texts out that give better examples than I

probably could have given. What I hope to have done is to give you the impetus to start really digging in and make you

WANT to learn assembly language.

In the next installment we will go and cover the UCSD p-

system for the TI and explain what the p-system is all about and the TI 99/4A implementation.

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T/MAKER II '210."

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Interfacing The TI-99/4A For Ham Radio And Shortwave Listening

by Harold Sims

The TI-99/4A, already a versatile home computer, can

be made all the more versatile with the addition of inexpensive software and hardware that will permit it to be used

for eavesdropping on the world. There are thousands of broadcasting facilities around the world that transmit RTTY (radioteletype), CW (Morse Code), and miscellaneous types of receivable data that will

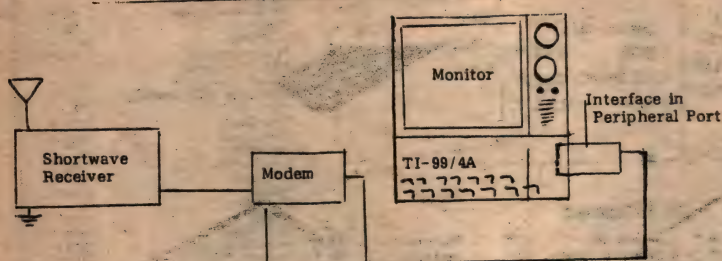
provide unlimited entertainment, enjoyment, and recreation for amateur radio enthusiasts, as well as for the SWL (Short Wave Listener) buff. To interface the TI-99/4A to receive such data requires

only a moderate outlay of money. The benefits to the computer professional and/or hobbyist is worth the expenditure involved. Until the advent of the microcomputer age, such a project would have involved the expenditure of a few thousand dollars, equipment that would have to be stuffed into a standard 5'x6' bathroom sized room to fit it all, and would have resulted in a whopping increase in one's electric utility rate. With micros, and miniaturization of components a fact of our age, interfacing to receive press, military, amateur, weather, international press organizations, data from ships at sea, etc., is no longer an herculean undertaking.

The Communications Act of 1934 made the "airwaves" public domain, and any citizen is privileged to receive transmitted data that comes over the air, providing of course that there is no attempt made to commercialize on that which is received, or to divulge its contents to other persons. In other words, one can listen in on the USIA (United States Information Agency) on 14638.0 KHz (Kilohertz) and "print" to their television or monitor screen the releases and ex-

INTERFACING THE TI-99/4A Harold A. Sims

Figure 1 Typical hookup for Shortwave, CW, RTTY



Connections:

- 1) Audio out from shortwave receiver
- 2) TTL out from Modem (commercial, or handmade)
- 3) TTL to "Hamssoft" interface

"Hamssoft" is treated as a peripheral device on TI-99/4A, therefore, opening is of the form OPEN #3: "HAMSOF". The interface is addressable from TI's console Basic.

INTERFACING THE TI-99/4A Harold A. Sims

Figure 2 Schematic Diagram for TTL Logic Decoder (Modem)



Parts Listing:

Case Builder's Choice (or 4"W x 2"D x 1 1/2"H)
Perfboard for circuit - cut to case size

J1, J2 RCA phono jack, or builder's choice
D1 5v 1/2 watt diode; D2, D3 1N914 General purpose diode
U1 Quad operational amplifier LM324 or equivalent
U2 Operational amplifier type 741 in 8 pin DIP or round case
Q1 General purpose npn silicon switching transistor 30V, 300mW

INTERFACING THE TI-99/4A Harold A. Sims

Figure 3 LISTING OF SOME POPULAR SHORTWAVE RTTY FREQUENCIES

COUNTRY	FREQ KHz	COUNTRY	FREQ KHz
Afghanistan	12085 15865	Poland (Warsaw)	6848/8133/13785
Angola (Luanda)	11000 22845	Rumania	6972
Bulgaria (BTA Sofia)	8055 13400	Singapore	10810/16150
Canada (CFH Halifax)	8696	Sudan (Khartoum)	18788
China (Shanghai)	13779/15856	Taiwan (Taipei)	7695/10960
Cuba (Prensa Latina)	8140	Tunisia (Tunis)	13610/17390
Cuba (Tass)	14901	Turkey (Ankara)	18040
Cyprus Diplomatic	19443	USA	
Czech (Prague)	5027/ 15898	AFP New York	15908
Egypt (Cairo)	7756/13652	National Weather Service	
England			8140/8125
Associated Press	6984/9349	US Coast Guard (Miami)	
Reuters Press	6854/9119		17203
France		US Information Agency	
AFP Paris	5842/10616		14638/18543
Diplomatic	16108/20080	Voice of America (Greenville)	
Germany	8088/9966		15752/19915
Hong Kong	7542/10730	USSR	
Indonesia		Tass (Moscow)	6870/6950
Jakarta	19825		18170/8140/9110
Diplomatic	16399	Vietnam (Hanoi)	10600/15744
Israel (Jerusalem)	19743	Yugoslavia (Belgrade)	5240/10438
Italy (Rome)	4804/8105/13898		
Japan			
Tokyo	17597		
Kyodo	11160/12070		
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CS

4/84

Interfacing The TI99/4A Continued from page 82

changes of this governmental agency. Care to eavesdrop on a French Diplomatic Channel? Then tune in a shortwave receiver interfaced to the TI-99/4A, or other similarly interfaced micro-computer, and "print" to the screen, or printer if desired, the language text of what has up till now been some funny "chirps", squeals, and

"garbage sounding", unintelligible data coming from the non-voice area on your shortwave receiver. For VOA (Voice of America) buffs who have only had voice transmissions reception capabilities until now, tune in the late evening world news at 13770MHz and "print" to screen, or printer. It's pure recreation and enjoyment for the SWL'er.

Amateur Radio operators, "hams", have been interfacing to these services for a few years

now, often using hand-me-down teletype machines that have been removed from service from data receiving and generating agencies. These metallic clunkers have been replaced by whisper quiet micros whose only sound accompaniments have come from printers.

Interfacing the TI-99/4A to this rapidly growing communications frontier can be done in less than 10 minutes, providing of course that the hobbyist has on hand all of the hardware and software configurations needed to do the job. To the console of the TI-99/4A the user attaches a small black box at the peripheral expansion port. This little box measures 2-1/2" wide x 4 1/2" length x 1" high. One-half inch of its length is absorb-

ed into the peripheral expansions port. The black box contains three large UART chips, and supportive configurations that controls the translation of the data received from the "receive-modem" into the standard ASCII character set data that is printed to the monitor, or printer. The little black box is the software for the TI-99/4A, and is available from the Kantronics Corporation of Topeka, Kansas. The "receive modem (modulator/demodulator)" is available from several sources.

The quality of the shortwave receiver is important. If at all possible, the receiver should have a sidebands selector switch. If this feature is not available to the purse-limits of the purchaser, then one should not settle for less than a

receiver with a BFO (Beat Frequency Oscillator). The closer one is to the center of a frequency tuned, the more accuracy is obtained in the received data. As with all transmitted data, the better the receiving antenna, the better the quality of the data that is received.

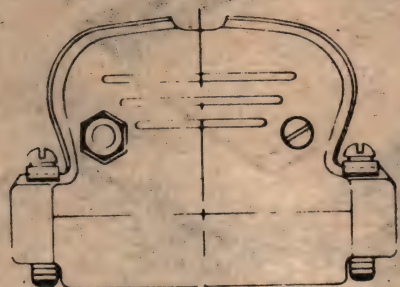
The interfacing is accomplished by cabling the shortwave receiver to the audio input terminals of the modem, (See Figure 1).

Ham radio enthusiasts are able to use the interfacing of the TI-99/4A with Amateur Radio equipment designed to send radio-teletype, and make their RTTY/CW station a send and receive data terminal. Numerous "ham radio" BBS already exists, and new ones are coming by the day. The sending process entails having a transceiver that is capable of withstanding the continuous duty cycle required to send modulated audio at medium power levels (50 watts, or so!). Operating a send-receive radio-teletype station, or CW (Morse Code) station requires an FCC license. While it is possible that a CB'er can accomplish the same result as the "ham" station, it is a violation of law to even attempt to do such a thing.

The Kantronic's "Hamsort" software also interfaces VIC-20, Atari, TRS-80-C and Apple.

The "modes" that the interfacing is capable of receiving are 110 and 300 baud ASCII, 60,67,75, and 100 baud radioteletype, and international standard 170,425 and 850 hertz shifts. Inverted shifts are selectable from the keyboard of the TI-99/4A console, and data sent in "inverted" modes can be received

Continued on page 86



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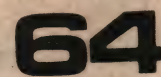
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Interfacing The TI99/4A Continued from page 84

as well. The Amateur radio buff is able to both send and receive in this wide variety of operating modes. Amateurs are able to use features of the software that enable the send of standard amateur radio

codings at the touch of the CTRL key and an appropriate alphanumeric key relative to the function needed (ex. "Break", "All After", "Invitation to Transmit", etc.). The module contains 10 message ports that the amateur may transmit as needed, enabling the sending of "brag tapes", address information, system information and configuration,

and QSL (confirmation of transmit and reception) reports. Each of the popular micros mentioned above has its own configuration in the Kantronics software, and display data in the formatting of its operating system. For the amateur operating the send-receive modes, and/or the SWL'er, the interfacing makes for a complete radio teletype

station.

The bonus of the interfacing system is a "toggle on/off" printer interfacing that allows for the use of a Centronics parallel type printer to print the data that is sent, and/or received. The printer is toggled on or off with either a CTRL code, or, as in the case of the TI-99/4A a FCTN code. With this feature built into the software, the amateur is able to keep a printed "log" of contacts, conversations with them, data received and sent, a record of time and date, and routines unique to ham radio. The SWL'er may choose to print the data that comes for later reading. An example of

this, I set my personal system to "print" Prensa Latina - Habana, Cuba's Press, to read the Cuban interpretation of the USA's actions related to Grenada. I also printed the VOA from Tangier to see the USA's interpretation of its actions. These, taken together was fascinating reading, exceeding the breadth and scope of reports in local newspapers. The listening/viewing/printing choices are almost limitless. In a single two hour session, I printed AP-London, Reuters-London, VOA-Tangiers, New

Continued on page 88

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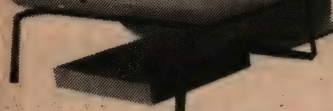
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Interfacing The TI99/4A Continued from page 86

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For those persons who do not have the TI Peripheral Expansion Box, RS232C module, and cabling that makes up a printer interface to the TI-99/4A, the Kantronics "Hamsoft" software is a real god-send of a bargain. Since it is a self contained parallel printer interface that is capable of operating independently of

the source codings used to convert RTTY and CW to TTL, it enables the addition of a printer to the TI-99/4A at an interfacing cost of less than a hundred dollars. Even if one has no interest in the communications aspect of the software, this feature alone makes it worth the bargain that it is!

The software is addressable form BASIC, the printer configurations operates in the normal file-open, file-close format of BASIC, and shortcuts may be taken to interfacing the needed modem. Inexpensive 7400 series IC's and a couple of

LED's and PLL chips will do the trick. For those desiring to save a few bucks, I have designed an interfacing circuit for a modem/demodem that can be built by the novice experimenter in just an hour or so. (See Figure 2).

Figure 3 is a listing of RTTY/CW Stations.

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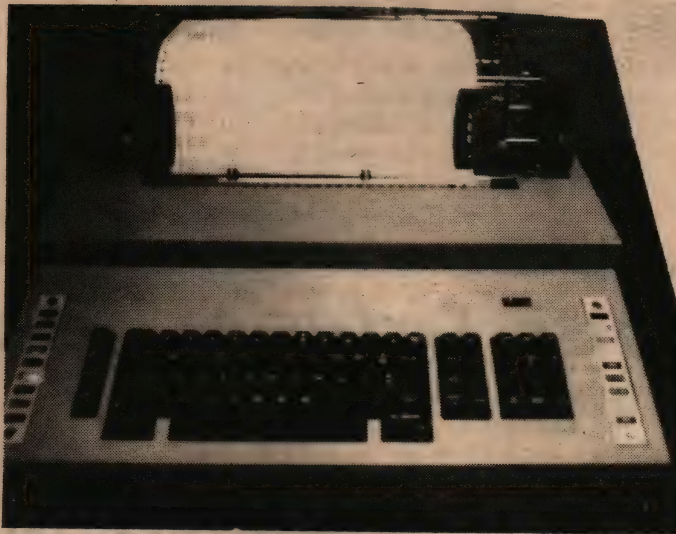
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Randy's Ravings

by Randy Holcomb

Welcome To The New Column! Well, as most of you know by now, TI has discontinued producing the hardware for the 99/4A home computer, but will be providing new software for an unspecified period of time. In addition, loads of third party vendors are gearing

up to fill the void left by the departure of TI, and some of these products sound exciting for all concerned. In addition, the TI Professional Computer has been getting well-deserved praise from the trade press as an outstanding machine. This column is for ALL TI and related products for the TI

99/4A, CC-40 and the TI Professional. (We may even sneak some of their mini stuff in on occasion as is newsworthiness merits.) Of course, let me state right off from that this is YOUR column as well--if you

Continued on page 91

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Randy's Ravings

Continued from page 90

feel there is a topic that needs to be covered by all means let me or the Editor here know about it. From time to time I suspect we will have an occasional guest columnist here and there to spice things up now and then.

"So TI is no longer making peripherals--now what?" is the cry of owners of the /4A who within the last year bought their systems and now want to expand. Well, take heart, for there are a LOT of companies making peripherals for the /4A, both standalone (where you do not need the Peripheral Expansion Box) and on cards (that are installed in the Peripheral Expansion Box.) There are questions you must ask yourself: Like, how much do you want to spend on an "Orphan" computer? How big do you want to expand your system? What pieces of software you would like to run your system that need expansion hardware like 32K memory card, RS232 card, modem, etc?

Let's start off by saying this: First and foremost, use your computer! This is far better than having it sit in a corner, gathering dust! Because of the large amount of cartridge based education software, the number of /4A's in the closet is not as bad as with other machines. If you are using it in this mode, you have a good start. Even though the TI is what some people call an "orphan" machine (and I dislike that term immensely--let's just say "discontinued") TI will still have parts and service for your machine for the next 5 years. (They have to--it's the law.)

The next step is to determine what you feel you would like to do to make your system more useful. Would you like to start using your machine for word processing, spreadsheets, and the like? TI has two excellent packages called TI-Writer for word processing and Multi-Plan (from Microsoft)

for spreadsheets. Both packages requires 32K memory, a disk system, and in the case of TI-Writer and RS232 card and a printer. Or perhaps you would like to get into assembly language or Pascal programming using the Editor/Assembler package or the UCSD P-system.

Some of these questions will be easier to answer than others. The big thing will be locating the peripherals necessary to run the software you want. Once you have that, then comes the point of getting the software! The first suggestion would be to get the software,

as that is usually the cheapest component to come by. At this time, TI-Writer and MultiPlan can be had for as little as \$70. Getting peripherals is the next step. Ideally the first step is to check your local computer dealer who handles TI. Most of these dealers are trying their best to stay on top of the peripherals scene (my local dealer is!) as dealers DO want your business! I was quite surprised the other day to see a 3rd party RS232 card that is almost a spitting image of a TI RS232 card (the case was different) at under \$100, and where the user can jumper the

card for ports 3 and 4 that before with the TI card you had to take to an exchange center to have them do it for you! There is a number of manufacturers making 32K memory modules, both standalone and cards for the PBox (our slang for the Peripheral Expansion System.) As for disk systems, the real critical item is the disk controller. To my knowledge there was only one 3rd party manufacturer of a disk system that had an integral controller and that was Percom, it was called the TX-99, and I really don't know if they have pulled the plug on

it or not. Just a few weeks ago, I heard that a new company called CorComp (which, by the way, made that RS232 card which I hope to review soon) is supposed to come out with their own disk controller card. As the Consumer Electronics Show is over, we should have a better idea what is still coming out for the /4A. Of course, publications like the Computer Shopper will ALWAYS be one of your standard reference points for the latest news.

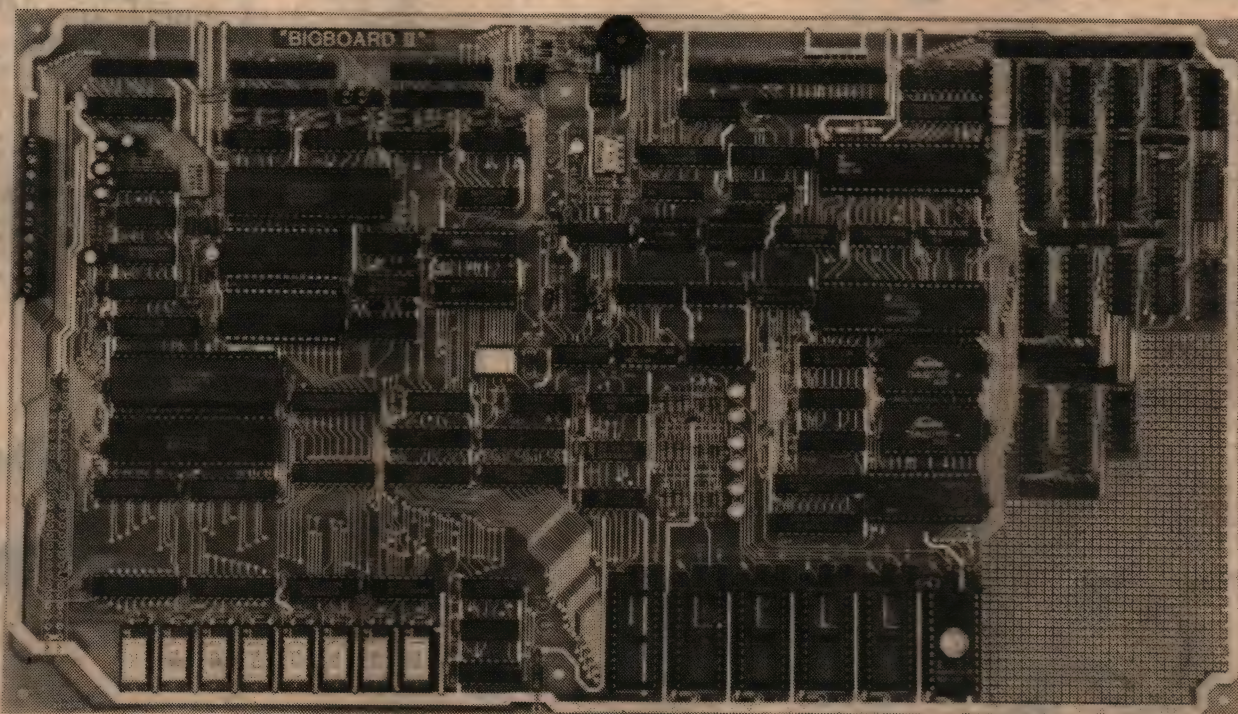
Continued on page 92

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Jim Ferguson, the designer of the "Big Board" distributed by Digital Research Computers, has produced a stunning new computer that Cal-Tex Computers has been shipping for a year. Called "Big Board II", it has the following features:

■ 4 MHz Z80-A CPU and Peripheral Chips

The new Ferguson computer runs at 4 MHz. Its Monitor code is lean, uses Mode 2 interrupts, and makes good use of the Z80-A DMA chip.

■ 64K Dynamic RAM + 4K Static CRT RAM + 24K E(PROM or Static RAM

"Big Board II" has three memory banks. The first memory bank has eight 4164 DRAMs that provide 60K of user space and 4K of monitor space. The second memory bank has two 2Kx8 SRAMs for the memory-mapped CRT display and space for six 2732As, 2Kx8 static RAMs, or pin-compatible EEPROMs. The third memory bank is for RAM or ROM added to the board via the STD bus. Whether bought as a bare board, an "unkit", or assembled and tested, it comes with a 2732 EPROM containing Russell Smith's superb Monitor.

■ Multiple-Density Controller for SS/DS Floppy Disks

The new Cal-Tex single-board computer has a multiple-density disk controller. It can use 1793 or 8877 controller chips since it generates the side signal with TTL parts. The board has two connectors for disk signals, one with 34 pins for 5.25" drives, the other with 50 pins for 8" drives.

■ Vastly Improved CRT Display

The new Ferguson SBC uses a 6845 CRT controller and SMC 8002 video attributes controller to produce a display rivaling the display of quality terminals. There are three display modes: Character block-graphics, and line-graphics. The board emulates an ADM-31 with 24 lines of 80 characters formed by a 7x9 dot matrix.

■ STD Bus

The new Ferguson computer has an STD Bus port for easy system expansion.

■ DMA

The new Ferguson computer has a Z80-A DMA chip that will allow byte-wise data transfers at 500 Kbytes per second and bit-serial transfers via the Z80-A SIO at 880 Kbits per second with minimal processor overhead. When a hard-disc subsystem is added, the DMA chip makes impressive disk performance possible.

SIZE: 8.75" x 15.5"

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■ "SASI" Interface for Winchester Disks

Our "Big Board II" implements the Host portion of the "Shugart Associates Systems Interface." Adding a Winchester disk drive is no harder than attaching a floppy-disk drive. A user simply 1) runs a fifty-conductor ribbon cable from a header on the board to a Xebec controller that costs only \$295 and implements the controller portion of the SASI interface, 2) cables the controller to a Seagate Technology ST-506 hard disk or one compatible with it, and 3) provides power for the controller-card and drive. Since our CBIOS contains code for communicating with hard-disks, that's all a user has to do to add a Winchester to a system!

■ Two Synchronous/Asynchronous Serial Ports

With a Z80-A SIO/O and a Z80-A CTC as a baud-rate generator, the new Ferguson computer has two full RS232-C ports. It autobauds on both.

■ A Parallel Keyboard Port + Four Other Parallel Ports for User I/O

The new Cal-Tex single-board computer has one parallel port for an ASCII keyboard and four others for user-defined I/O.

■ Two Z80-A CTCs = Eight Programmable Counters/Timers

The new Ferguson computer has two Z80-A CTCs. One is used to clock data into and out of the Z80-A SIO/O, while the other is for systems and applications use.

■ PROM Programming Circuitry

The new Cal-Tex SBC has circuitry for programming 2716s, 2732(A)s, or pin-compatible EEPROMs.

■ CP/M 2.2**

CP/M with Russell Smith's CBIOS for the new Cal-Tex computer is available for \$150. The CBIOS is available separately for \$25.

* The "unkit" is a fully-socketed, wave-soldered "Big Board II". It requires NO soldering. All an "unkit" purchaser must do is carefully insert the prime ICs we supply in the proper sockets and systematically proceed to bring up and test the board.

**CP/M is a registered trademark of Digital Research

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Randy's Ravings
Continued from page 91

In order to start the ball rolling, I would like to request that if you belong to a TI-related User's Group and you are not listed here in Computer Shopper I urge you to send in the club's name and address to us here; it's FREE and can put you in touch with other users groups around the country. Funware, one of the few

makers of cartridge-based software for the 99/4A is phasing out all its remaining TI-based cartridges and will no longer publish software for the 99/4A. Some of Funware's more popular cartridges included Demon Driver and Bob Peterson's Henhouse. whether or not another software firm will pick up the rights to Funware's software is up in the air. Infocom, publishers of the dreaded Zork series and other

fantasy-type games have said they will produce versions of their games for the 99/4A as well as the TI professional.

AJ International and Doryt Systems, makers of peripheral add-ons for the 99/4A, have gone under. Price erosion of TI's peripherals for under \$100 and TI's leaving the market segment are the probable causes of their demise.

In next month's column we will present information on

how to use the CompuServe information service and the TE2TRN program to upload

and download software for your TI 99/4A, and an updated list of TI-related BBS Systems that you can access, as well as news from the TI front. Suggestions for future column material are welcome; address them to me, c/o Editorial Department, Computer Shopper or you can send me EMAIL on CompuServe to User ID 74065,1266.

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| 7. NEC PC - 800 1A | 14. Zenith Z-100 (DD) |

Texas Instruments Adds Portable Computers To TI PC Family

A portable computer fully compatible with the desktop TI Professional Computer has been announced by Texas Instruments. The new model is available with either a built-in 9-inch color or monochrome display.

The TI Portable Professional

Computer offers the same high-resolution graphics, color capability, memory expansion up to 768K bytes, internal modems, and easy-to-use keyboard as the Texas Instruments Professional Computer. Because the new portable is totally compatible with the TI Professional Computer,

an extensive software library and numerous hardware options are available.

All software programs are available for the Texas Instruments Professional Computer, such as MS(tm)-DOS, Lotus' 1-2-3(tm) and TI's own NaturalLink(tm) access to the Dow Jones News/Retrieval(R), are compatible with the TI Portable Professional Computer. Also available for both computers is TI's Speech Command(tm) system and support for the EtherSeries(tm) local area network. A 10M byte Winchester disk option is available now for the desktop model and was scheduled to be available in the first quarter of 1984 for the new portable.

TI feels that the combination of features being offered on the TI Portable Professional Computer is the most sophisticated available on any computer of its kind on the market. The TI Portable Professional Computer is designed for professionals and executives who need to acquire information, analyze data and communicate decisions without time and location constraints. The portable can improve productivity in a variety of jobs that re-

quire occasional computer mobility.

The new portable can also enhance productivity in specific environments. With this computer, consultants can conduct on-site analysis, journalists and writers can do word processing on location, and auditors can run their clients' working model on the spot.

The keyboard of the TI Portable Professional Computer attaches to the system unit, which contains the central processing unit, the video display monitor and the diskette drive. A built-in storage compartment for cable and electric cords make the computer easy to pack, and a built-in handle

makes it easy to carry.

Other features include a 16-bit 8088 central processor, a minimum of 64K bytes of random access memory (RAM) expandable to 768K bytes, five expansion slots, and an integral 5-1/4 inch half-high floppy diskette drive with space for an additional built-in disk drive option. Storage capacity of an individual floppy diskette is 320K bytes under MS-DOS 1.1 and 360K bytes with MS-DOS 2.1. The portable version will support all communication products currently available for the TI Professional Computer including TTY, 3270 and

Continued on page 94

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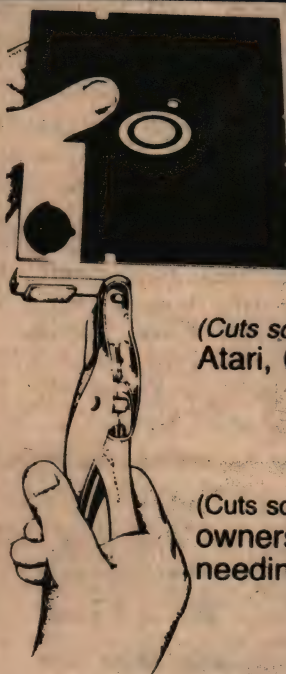
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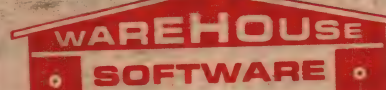
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TI Portable
Continued from page 92

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For further information contact Texas Instruments, Data Systems Group, P.O. Box 402430, H-689, Dallas, TX 75240 or call 1-800-527-3500.

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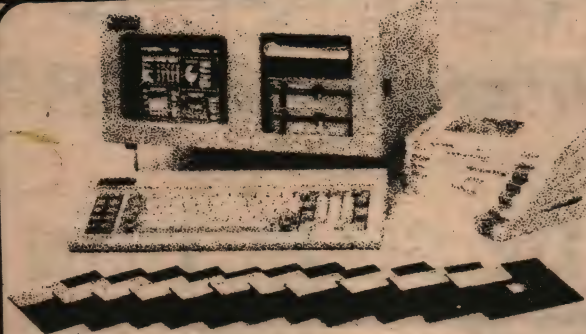
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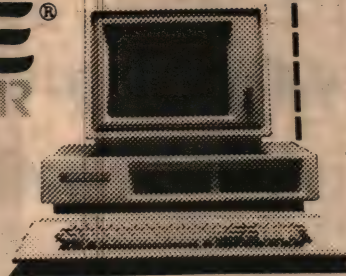


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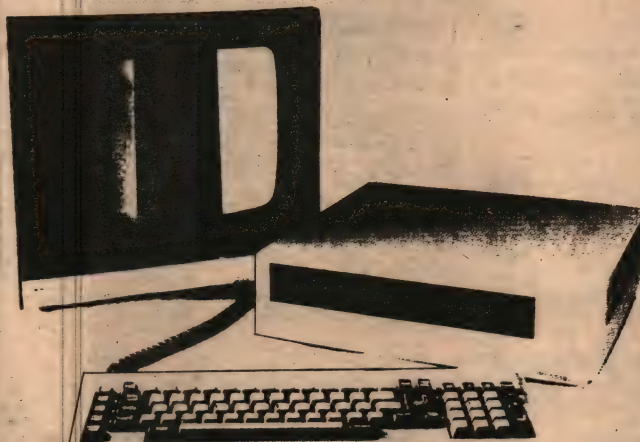
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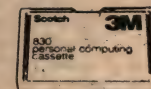
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TMS2564	8192 x 8 (450ns) (5v)	14.95
MCM68764	8192 x 8 (450ns) (5v) (24 pin)	39.95
MCM68766	8192 x 8 (350ns) (5v) (24 pin)(pwr dn.)	42.95
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5v = Single 5 Volt Supply 21vPGM = Program at 21 Volts

EPROM ERASERS
SPECTRONICS CORPORATION

	Timer	Capacity Chip	Intensity (uW/Cm ²)	
PE-14		9	8,000	83.00
PE-14T	X	9	8,000	119.00
PE-24T	X	12	9,600	175.00
PL-265T	X	30	9,600	255.00
PR-125T	X	25	17,000	349.00
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32.768 khz	1.95
1.0 mhz	3.95
1.8432	3.95
2.0	2.95
2.097152	2.95
2.4576	2.95
3.2768	2.95
3.579545	2.95
4.0	2.95
5.0	2.95
5.0688	2.95
5.185	2.95
5.7143	2.95
6.0	2.95
6.144	2.95
6.5536	2.95
8.0	2.95
10.0	2.95
10.738635	2.95
14.31818	2.95
15.0	2.95
16.0	2.95
17.430	2.95
18.0	2.95
18.432	2.95
20.0	2.95
22.1184	2.95
32.0	2.95

CMOS

4000	.29	4528	1.19
4001	.25	4531	.95
4002	.25	4532	1.95
4006	.89	4538	1.95
4007	.29	4539	1.95
4008	.95	4541	2.64
4009	.39	4543	1.19
4010	.45	4553	5.79
4011	.25	4555	.95
4012	.25	4556	.95
4013	.38	4581	1.95
4014	.79	4582	1.95
4015	.39	4584	.75
4016	.39	4585	.75
4017	.69	4702	12.95
4018	.79	74C00	.35
4019	.39	74C02	.35
4020	.75	74C04	.35
4021	.79	74C08	.35
4022	.79	74C10	.35
4023	.29	74C14	.59
4024	.65	74C20	.35
4025	.29	74C30	.35
4026	1.65	74C32	.39
4027	.45	74C42	1.29
4028	.69	74C48	1.99
4029	.79	74C73	.65
4030	.39	74C74	.65
4034	1.95	74C76	.80
4035	.85	74C83	1.95
4040	.75	74C85	1.95
4041	.75	74C86	.39
4042	.69	74C89	4.50
4043	.85	74C90	1.19
4044	.79	74C93	1.75
4046	.85	74C95	.99
4047	.95	74C107	.89
4049	.35	74C150	5.75
4050	.35	74C151	2.25
4051	.79	74C154	3.25
4053	.79	74C157	1.75
4060	.89	74C160	1.19
4066	.39	74C161	1.19
4068	.39	74C162	1.19
4069	.29	74C163	1.19
4070	.35	74C164	1.39
4071	.29	74C165	2.00
4072	.29	74C173	.79
4073	.29	74C174	1.19
4075	.29	74C175	1.19
4076	.79	74C192	1.49
4078	.29	74C193	1.49
4081	.29	74C195	1.39
4082	.29	74C200	5.75
4085	.95	74C221	1.75
4086	.95	74C244	2.25
4093	.49	74C373	2.45
4098	2.49	74C374	2.45
4099	1.95	74C901	.39
14409	12.95	74C902	.85
14410	12.95	74C903	.85
14411	11.95	74C905	10.95
14412	12.95	74C906	.95
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14433	14.95	74C908	2.00
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4503	.65	74C910	9.95
4508	1.95	74C911	8.95
4510	.85	74C912	8.95
4511	.85	74C914	1.95
4512	.85	74C915	1.19
4514	1.25	74C918	2.75
4515	1.79	74C920	17.95
4516	1.55	74C921	15.95
4518	.89	74C922	4.49
4519	.39	74C923	4.95
4520	.79	74C925	5.95
4522	1.25	74C926	7.95
4526	1.25	74C928	7.95
4527	1.95	74C929	19.95

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AY3-1014	6.95
AY5-1013	3.95
AY3-1015	6.95
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MK4332	32768 x 1 (200ns)	9.95
4164-200	65536 x 1 (200ns) (5v)	5.95
4164-150	65536 x 1 (150ns) (5v)	6.95
MCM6865	65536 x 1 (200ns) (5v)	8.95
TMS4164-15	65536 x 1 (150ns) (5v)	8.95

5V = single 5 volt supply

6800

68000	49.95
6800	2.95
6802	7.95
6803	19.95
6808	13.90
6809E	14.95
6809	11.95
6810	2.95
6820	4.35
6821	2.95
6828	14.95
6840	12.95
6843	34.95
6844	25.95
6845	14.95
6847	11.95
6850	3.25
6852	5.75
6860	7.95
6875	6.95
6880	2.25
6883	22.95
68047	24.95
68488	19.95
6800 = 1MHZ	
68B00	10.95
68B02	22.25
68B09E	29.95
68B09	29.95
68B10	6.95
68B21	6.95
68B40	19.95
68B45	19.95
68B50	5.95
68B00 = 2 MHZ	

6500

6502	1 MHZ	4.95
6504		6.95
6505		8.95
6507		9.95
6520		4.35
6522		6.95
6532		9.95
6545		22.50
6551		11.85
6502A	2 MHZ	6.95
6522A		9.95
6532A		11.95
6545A		27.95
6551A		11.95
6502B	3 MHZ	9.95

DISC CONTROLLERS

1771	16.95
1791	24.95
1793	26.95
1795	29.95
1797	49.95
2791	54.95
2793	54.95
2795	59.95
2797	59.95
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8272	39.95
UPD765	39.95
MB8876	29.95
MB8877	34.95
1691	17.95
2143	18.95

8000

8035	5.95
8039	5.95
INS-8060	17.95
INS-8073	49.95
8080	3.95
8085	4.95
8085A-2	11.95
8086	24.95
8087	CALL
8088	29.95
8089	89.95
8155	6.95
8155-2	7.95
8156	6.95
8185	29.95
8185-2	39.95
8741	29.95
8748	24.95
8755	24.95

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6845	14.95
68B45	19.95
HD46505SP	15.95
6847	11.95
MC1372	6.95
68047	

2114

450 NS

8/\$995

2114

250 NS

8/\$1095

74LS00

74LS00	.24	74LS173	.89
74LS01	.25	74LS174	.55
74LS02	.25	74LS175	.55
74LS03	.25	74LS181	2.15
74LS04	.24	74LS189	8.95
74LS05	.25	74LS190	.89
74LS08	.28	74LS191	.89
74LS09	.29	74LS192	.79
74LS10	.25	74LS193	.79
74LS11	.35	74LS194	.89
74LS12	.35	74LS195	.89
74LS13	.45	74LS196	.79
74LS14	.59	74LS197	.79
74LS15	.35	74LS221	.89
74LS20	.25	74LS240	.95
74LS21	.29	74LS241	.99
74LS22	.25	74LS242	.99
74LS26	.29	74LS243	.99
74LS27	.29	74LS244	1.29
74LS28	.35	74LS245	1.49
74LS30	.25	74LS247	.75
74LS32	.29	74LS248	.99
74LS33	.55	74LS249	.99
74LS37	.35	74LS251	.59
74LS38	.35	74LS253	.59
74LS40	.25	74LS257	.59
74LS42	.49	74LS258	.59
74LS47	.75	74LS259	2.75
74LS48	.75	74LS260	.59
74LS49	.75	74LS266	.55
74LS51	.25	74LS273	1.49
74LS54	.29	74LS275	3.35
74LS55	.29	74LS279	.49
74LS63	1.25	74LS280	1.99
74LS73	.39	74LS283	.89
74LS74	.35	74LS290	.89
74LS75	.39	74LS293	.89
74LS76	.39	74LS295	.99
74LS78	.49	74LS298	.89
74LS83	.60	74LS299	1.75
74LS85	.69	74LS323	3.50
74LS86	.39	74LS324	1.75
74LS90	.55	74LS352	1.29
74LS91	.89	74LS353	1.29
74LS92	.55	74LS363	1.35
74LS93	.55	74LS364	1.95
74LS95	.75	74LS365	.49
74LS96	.89	74LS366	.49
74LS107	.39	74LS367	.45
74LS109	.39	74LS368	.45
74LS112	.39	74LS373	1.39
74LS113	.39	74LS374	1.39
74LS114	.39	74LS375	.95
74LS122	.45	74LS377	1.39
74LS123	.79	74LS378	1.18
74LS124	2.90	74LS379	1.35
74LS125	.49	74LS385	3.90
74LS126	.49	74LS386	.45
74LS132	.59	74LS390	1.19
74LS133	.59	74LS393	1.19
74LS136	.39	74LS395	1.19
74LS137	.99	74LS399	1.49
74LS138	.55	74LS424	2.95
74LS139	.55	74LS447	.95
74LS145	1.20	74LS490	1.95
74LS147	2.49	74LS624	3.99
74LS148	1.35	74LS640	2.20
74LS151	.55	74LS645	2.20
74LS153	.55	74LS668	1.69
74LS154	1.90	74LS669	1.89
74LS155	.69	74LS670	1.49
74LS156	.69	74LS674	14.95
74LS157	.65	74LS682	3.20
74LS158	.59	74LS683	3.20
74LS160	.69	74LS684	3.20
74LS161	.65	74LS685	3.20
74LS162	.69	74LS688	2.40
74LS163	.65	74LS689	3.20
74LS164	.69	81LS95	1.49
74LS165	.95	81LS96	1.49
74LS166	1.95	81LS97	1.49
74LS168	1.75	81LS98	1.49
74LS169	1.75	25LS2521	2.80
74LS170	1.49	25LS2589	4.25

74S00

74S00	.32	74S132	1.24	74S225	7.95
74S02	.35	74S133	.45	74S240	2.20
74S03	.35	74S134	.50	74S241	2.20
74S04	.35	74S135	.89	74S244	2.20
74S05	.35	74S138	.85	74S251	.95
74S08	.35	74S139	.85	74S253	.95
74S09	.40	74S140	.55	74S257	.95
74S10	.35	74S151	.95	74S258	.95
74S11	.35	74S153	.95	74S260	.79
74S15	.35	74S157	.95	74S273	2.45
74S20	.35	74S158	.95	74S274	19.95
74S22	.35	74S161	1.95	74S275	19.95
74S30	.35	74S162	1.95	74S280	1.95
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74S37	.88	74S168	3.95	74S288	1.90
74S38	.85	74S169	3.95	74S289	6.89
74S40	.35	74S174	.95	74S301	6.95
74S51	.35	74S175	.95	74S373	2.45
74S64	.40	74S181	3.95	74S374	2.45
74S65	.40	74S182	2.95	74S381	7.95
74S74	.50	74S188	1.95	74S387	1.95
74S85	1.99	74S189	6.95	74S412	2.98
74S86	.50	74S194	1.49	74S471	4.95
74S112	.50	74S195	1.49	74S472	4.95
74S113	.50	74S196	1.49	74S474	4.95
74S114	.55	74S197	1.49	74S482	15.25
74S124	2.75	74S201	6.95	74S570	2.95
				74S571	2.95

INTERFACE

8T28	1.59
8T28	1.89
8T95	.89
8T96	.89
8T97	.89
8T98	.89
DM8131	2.95
DP8304	2.29
DS8833	2.25
DS8835	1.99
DS8836	.99
DS8837	1.65
DS8838	1.30

DATA ACQUISITION

ADC0800	15.55	DAC0808	2.95
ADC0804	3.49	DAC1020	8.25
ADC0809	4.49	DAC1022	5.95
ADC0817	9.95	MC1408L6	1.95
DAC0800	4.95	MC1408L8	2.95

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RS232 Male	2.50
RS232 Female	3.25
RS232 Hood	1.25
S-100 ST	3.95

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XR 2206	3.75
XR 2207	3.75
XR 2208	3.75
XR 2211	5.25
XR 2240	3.25

INTERSIL

ICL7106	9.95
ICL7107	12.95
ICL7660	2.95
ICL8038	3.95
ICM7207A	5.59
ICM7208	15.95

9000

9316	1.00
9334	2.50
9358	3.95
9401	9.95
9601	.75
9602	1.50
96S02	1.95

VOLTAGE REGULATORS

7805T	.75	7905T	.85
78M05C	.35	7908T	.85
7808T	.75	7912T	.85
7812T	.75	7915T	.85
7815T	.75	7924T	.85
7824T	.75	7905K	1.49
7805K	1.39	7912K	1.49
7812K	1.39	7915K	1.49
7815K	1.39	7924K	1.49
7824K	1.39	79L05	.79
78L05	.69	79L12	.79
78L12	.69	79L15	.79
78L15	.69	LM323K	4.95
78H05K	9.95	UA78S40	1.95
78H12K	9.95		

C, T = TO-220 K = TO-3
L = TO-92

SOUND CHIPS

76477	3.95	AY3-8910	12.95
76488	5.95	AY3-8912	12.95
76489	8.95	MC3340	1.49

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(CALIFORNIA RESIDENTS)



LINEAR

LM301	.34	LM340 (see 7800)		LM565	.99	LM1558H	3.10	CA 3023	2.75	CA 3082	1.65
LM301H	.79	LM348	.99	LM566	1.49	LM1800	2.37	CA 3039	1.29	CA 3083	1.55
LM307	.45	LM350K	4.95	LM567	.89	LM1812	8.25	CA 3046	1.25	CA 3086	.80
LM308	.69	LM350T	4.60	NE570	3.95	LM1830	3.50	CA 3059	2.90	CA 3089	2.99
LM308H	1.15	LM358	.69	NE571	2.95	LM1871	5.49	CA 3060	2.90	CA 3096	3.49
LM309H	1.95	LM359	1.79	NE590	2.50	LM1872	5.49	CA 3065	1.75	CA 3130	1.30
LM309K	1.25	LM376	3.75	NE592	2.75	LM1877	3.25	CA 3080	1.10	CA 3140	1.15
LM310	1.75	LM377	1.95	LM709	.59	LM1889	1.95	CA 3081	1.65	CA 3146	1.85
LM311	.64	LM378	2.50	LM710	.75	LM1896	1.75		CA 3160	1.19	
LM311H	.89	LM379	4.50	LM711	.79	ULN2003	2.49				
LM312H	1.75	LM380	.89	LM723	.49	LM2877	2.05				
LM317K	3.95	LM380N-8	1.10	LM723H	.55	LM2878	2.25				
LM317T	1.19	LM381	1.60	LM733	.98	LM2900	.85	TL494	4.20	75365	1.95
LM318	1.49	LM382	1.60	LM741	.35	LM2901	1.00	TL496	1.65	75450	.59
LM318H	1.59	LM383	1.95	LM741N-14	.35	LM3900	.59	TL497	3.25	75451	.39
LM319H	1.90	LM384	1.95	LM741H	.40	LM3905	1.25	75107	1.49	75452	.39
LM319	1.25	LM386	.89	LM747	.69	LM3909	.98	75110	1.95	75453	.39
LM320 (see 7900)		LM387	1.40	LM748	.59	LM3911	2.25	75150	1.95	75454	.39
LM322	1.65	LM389	1.35	LM1014	1.19	LM3914	3.95	75154	1.95	75491	.79
LM323K	4.95	LM390	1.95	LM1303	1.95	LM3915	3.95	75188	1.25	75492	.79
LM324	.59	LM392	.69	LM1310	1.49	LM3916	3.95	75189	1.25	75493	.89
LM329	.65	LM393	1.29	MC1330	1.69	MC4024	3.95				
LM331	3.95	LM394H	4.60	MC1349	1.89	MC4044	4.50				
LM334	1.19	LM399H	5.00	MC1350	1.19	RC4136	1.25				
LM335	1.40	NE531	2.95	MC1358	1.69	RC4151	3.95				
LM336	1.75	NE555	.34	MC1372	6.95	LM4250	1.75	TL071	.79	TL084	2.19
LM337K	3.95	NE556	.65	LM1414	1.59	LM4500	3.25	TL072	1.19	LF347	2.19
LM337T	1.95	NE558	1.50	LM1458	.59	RC4558	.69	TL074	2.19	LF351	.60
LM338K	6.95	NE561	24.95	LM1488	.69	LM13080	1.29	TL081	.79	LF353	1.00
LM339	.99	NE564	2.95	LM1489	.69	LM13600	1.49	TL082	1.19	LF355	1.10
				LM1496	.85	LM13700	1.49	TL083	1.19	LF356	1.10

H = TO-5 CAN

T = TO-220

K = TO-3

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CAPACITORS**TANTALUM**

	6V	10V	15V	20V	25V	35V
.22uf						.40
.27						.40
.33						.40
.47				.35		.50
.68						.45
1.0			.40	.40	.45	.45
1.5				.45		.50
1.8						.75
2.2		.35	.40	.45		.65
2.7		.40	.45			.90
3.3		.45	.50	.55	.60	.65
3.9		.45				
4.7	.45	.55		.60	.65	.85
6.8			.70		.75	
8.2						1.00
10	.55	.65	.80	.85	.90	1.00
12	.65		.85	.90		
15	.75	.85	.90			
18			1.25			
22		1.00	1.35			
27			2.25			
39		1.50				
47	1.35					
56	1.75					
100		3.25				
270	3.75					

DISC

10pf	50V	.05	470	50V	.05
22	50V	.05	560	50V	.05
25	50V	.05	680	50V	.05
27	50V	.05	820	50V	.05
33	50V	.05	.001uf	50V	.05
47	50V	.05	.0015	50V	.05
56	50V	.05	.0022	50V	.05
68	50V	.05	.005	50V	.05
82	50V	.05	.01	50V	.07
100	50V	.05	.02	50V	.07
220	50V	.05	.05	50V	.07
330	50V	.05	.1	12V	.10
			.1	50V	.12

MONOLITHIC

.1uf-mono	50V	.18	.47uf-mono	50V	.25
.047uf-mono	50V	.15	.01uf-mono	50V	.14

ELECTROLYTIC

RADIAL			AXIAL		
.47uf	50V	.14	1uf	50V	.14
1	25V	.14	4.7	16V	.14
2.2	35V	.15	10	16V	.14
4.7	50V	.15	10	50V	.16
10	50V	.15	22	16V	.14
47	35V	.18	47	50V	.20
100	16V	.18	100	15V	.20
220	35V	.20	100	35V	.25
470	25V	.30	150	25V	.25
2200	16V	.60	220	25V	.30
			330	16V	.40
			500	16V	.42
			1000	16V	.60
			1500	16V	.70
			6000	16V	.85

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26,000uf 30V 3.95

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4N26	1.00	MCA-7	4.25
4N27	1.10	MCA-255	1.75
4N28	.69	IL-1	1.25
4N33	1.75	ILA-30	1.25
4N35	1.25	ILQ-74	2.75
4N37	1.25	H11C5	1.25
MCT-2	1.00	TIL-111	1.00
MCT-6	1.50	TIL-113	1.75

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1N751	5.1 volt zener	.25
1N759	12.0 volt zener	.25
1N4148	(1N914) switching	25/1.00
1N4004	400PIV rectifier	10/1.00
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KBP04	400PIV 1.5amp bridge	.55
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SPST mini-pushbutton	.39

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MPS918	.25	2N3772	1.85
2N2102	.75	2N3903	.25
2N2218	.50	2N3904	.10
2N2218A	.50	2N3906	.10
2N2219	.50	2N4122	.25
2N2219A	.50	2N4123	.25
2N2222	.25	2N4249	.25
PN2222	.10	2N4304	.75
MPS2369	.25	2N4401	.25
2N2484	.25	2N4402	.25
2N2905	.50	2N4403	.25
2N2907	.25	2N4857	1.00
PN2907	.125	PN4916	.25
2N3055	.79	2N5086	.25
3055T	.69	PN5129	.25
2N3393	.30	PN5139	.25
2N3414	.25	2N5209	.25
2N3563	.40	2N6028	.35
2N3565	.40	2N6043	1.75
PN3565	.25	2N6045	1.75
MPS3638	.25	MPS-A05	.25
MPS3640	.25	MPS-A06	.25
PN3643	.25	MPS-A55	.25
PN3644	.25	TIP29	.65
MPS3704	.15	TIP31	.75
		TIP32	.79

BYPASS CAPS

.01 UF DISC	100/6.00
.01 UF MONOLITHIC	100/12.00
1 UF DISC	100/8.00
1 UF MONOLITHIC	100/15.00

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JUMBO GREEN	.18	.15
JUMBO YELLOW	.18	.15
LED MOUNTING HARDWARE	.10	.09

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HP 5082-7760	.43"	CC	1.29
MAN 72	.3"	CA	.99
MAN 74	.3"	CC	.99
FND-357 (359)	.375"	CC	1.25
FND-500 (503)	.5"	CC	1.49
FND-507 (510)	.5"	CA	1.49
TIL-311 4x7	.270"	HEX W/LOGIC	9.95

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1/4 WATT 5% CARBON FILM ALL STANDARD VALUES FROM 1 OHM TO 10 MEG OHM	
50 PCS. SAME VALUE	.025
100 PCS. SAME VALUE	.02
1000 PCS. SAME VALUE	.015

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1-99	100
8 pin ST	.13 .11
14 pin ST	.15 .12
16 pin ST	.17 .13
18 pin ST	.20 .18
20 pin ST	.29 .27
22 pin ST	.30 .27
24 pin ST	.30 .27
28 pin ST	.40 .32
40 pin ST	.49 .39
64 pin ST	4.25 call
ST = SOLDER TAIL	
8 pin WW	.59 .49
14 pin WW	.69 .52
16 pin WW	.69 .58
18 pin WW	.99 .90
20 pin WW	1.09 .98
22 pin WW	1.39 1.28
24 pin WW	1.49 1.35
28 pin WW	1.69 1.49
40 pin WW	1.99 1.80
WW = WIREWRAP	
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24 pin ZIF	7.95 call
28 pin ZIF	8.95 call
ZIF = TEXT TOOL	
(Zero Insertion Force)	

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64K EPROM

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Includes:

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 12VAC 500ma 4.95
 12VAC 1amp 5.95
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DC ADAPTER6, 9, 12 VDC selectable with universal
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SHUGART

SA 400L 5¼" (40 TRACK) SS/DD 199.95
 SA 400 5¼" (35 TRACK) SS/DD 189.95

PERTEC

FD-200 5¼" SS/DD 179.95
 FD-250 5¼" DS/DD 199.95

MPI

MP-52 5¼" (FOR IBM) DS/DD 249.00

NOTE: Please include sufficient amount for
shipping on above items.**EDGE-CARD
CONNECTORS**

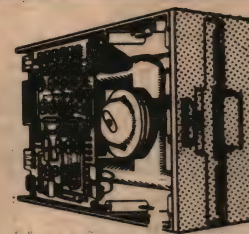
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 72 pin ST 6.95
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 50 pin ST 4.95
 44 pin ST 2.95
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IDCEN36 Ribbon Cable 36 Pin Male 8.95
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**8-INCH
DISK DRIVE
SALE****FD 100-8**SHUGART 801 EQUIV.
SS/DD — 10/\$175 EA.**FD 200-8**SHUGART 851 EQUIV.
DS/DD — 10/\$220 EA.**\$189⁰⁰****\$239⁰⁰****CABINETS FOR 5¼" DISK DRIVES****CABINET #1 \$29.95**

- ★ DIMENSIONS 8½ x 5½ x 3½"
- ★ COLOR MATCHES APPLE
- ★ FITS STANDARD 5¼" DRIVES,
INCL. SHUGART
- ★ INCLUDES MOUNTING
HARDWARE AND FEET

CABINET #2 \$79.00

- ★ COMPLETE WITH POWER
SUPPLY, SWITCH, LINE
CORD, FUSE & STANDARD
POWER CONNECTOR
- ★ DIMENSIONS: 11½ x 5½ x 3½"
- ★ +5V @ 1 AMP, +12V @ 1.5 AMP
- ★ FITS STANDARD 5¼" DRIVES
- ★ PLEASE SPECIFY
GRAY OR TAN

NOTE: Please include sufficient amount for
shipping on above items.**DIP CONNECTORS**

DESCRIPTION	HIGH RELIABILITY TOOLED ST IC SOCKETS	COMPONENT CARRIERS (DIP HEADERS)	RIBBON CABLE DIP PLUGS (IDC)
ORDER BY	AUGATxx-ST	ICCxx	IDPxx
CONTACTS 8	.99	.65	
14	.99	.75	1.45
16	.99	.85	1.65
18	1.69	1.00	
20	1.89	1.25	
22	1.89	1.25	
24	1.99	1.35	2.50
28	2.49	1.50	
40	2.99	2.10	4.15

For order instructions see "IDC Connectors" below.

RIBBON CABLE

CONTACTS	SINGLE COLOR		COLOR CODED	
	1'	10'	1'	10'
10	.50	4.40	.83	7.30
16	.55	4.80	1.00	8.80
20	.65	5.70	1.25	11.00
25	.75	6.60	1.32	11.60
26	.75	6.60	1.32	11.60
34	.98	8.60	1.65	14.50
40	1.32	11.60	1.92	16.80
50	1.38	12.10	2.50	22.00

D-SUBMINIATURE

DESCRIPTION	SOLDER CUP		RIGHT ANGLE PC SOLDER		IDC RIBBON CABLE		HOODS	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	BLACK	GREY
ORDER BY	DBxxP	DBxxS	DBxxPR	DBxxSR	IDBxxP	IDBxxS	HOOD-B	HOOD
CONTACTS 9	2.08	2.66	1.65	2.18	3.37	3.69	—	1.60
15	2.69	3.63	2.20	3.03	4.70	5.13	—	1.60
25	2.50	3.25	3.00	4.42	6.23	6.84	1.25	1.25
37	4.80	7.11	4.83	6.19	9.22	10.08	—	2.95
50	6.06	9.24	—	—	—	—	—	3.50

For order instructions see "IDC Connectors" below.

MOUNTING HARDWARE 1.00**IDC CONNECTORS**

DESCRIPTION	SOLDER HEADER	RIGHT ANGLE SOLDER HEADER	WW HEADER	RIGHT ANGLE WW HEADER	RIBBON HEADER SOCKET	RIBBON HEADER	RIBBON EDGE CARD
ORDER BY	IDHxxS	IDHxxSR	IDHxxW	IDHxxWR	IDSxx	IDMxx	IDExx
CONTACTS 10	.82	.85	1.86	2.05	1.15	—	2.25
20	1.29	1.35	2.98	3.28	1.86	5.50	2.36
26	1.68	1.76	3.84	4.22	2.43	6.25	2.65
34	2.20	2.31	4.50	4.45	3.15	7.00	3.25
40	2.58	2.72	5.28	4.80	3.73	7.50	3.80
50	3.24	3.39	6.63	7.30	4.65	8.50	4.74

ORDERING INSTRUCTIONS: Insert the number of contacts in the position marked "xx" of the "order by" part number listed. Example: A 10 pin right angle solder style header would be IDH10SR.

FOR APPLE COMPUTER USERS



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JDR 16K RAM CARD FOR APPLE II+

- ★ Expand your 48K Apple to 64K
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 - ★ 2 YEAR WARRANTY
- Kit with Instructions \$40.95
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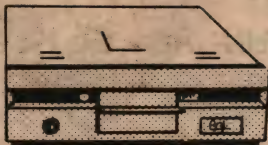
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GET SLIM IN 1984!

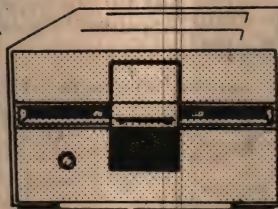
JDR HALF-HEIGHT DISK DRIVE

- ★ 35 Track if used with Apple Controller
- ★ 40 Track Controller and DOS Available (Call for Price)

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MA SYSTEMS FD-35 DISK DRIVE



\$199.95

- ★ Shugart Mechanism — Made in U.S.A.
- ★ Direct Replacement for Apple Disk II
- ★ Compatible with Apple Controller or other Apple compatible controllers
- ★ Specially designed electronics with low power consumption
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- ★ One Year Warranty

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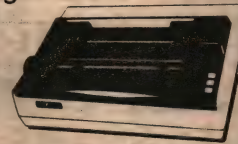
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- ★ Instructions Included

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FD1D SOFT SECTOR, SS/DD	30.00
FD2D SOFT SECTOR, DS/DD	36.75

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SS/DD SOFT SECTOR

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- ★ 75 DISK STORAGE CAPACITY
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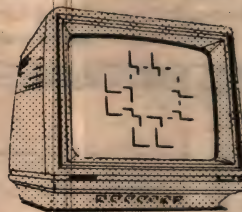
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TI Announces Enhanced Version Of MSDOS Microsoft Operating System For TI PC

Texas Instruments has announced the availability of MS(tm)-DOS 2.1 for the TI Professional Computer Family. The new operating system provides significant enhancements to the original MS-DOS 1.0.

The updated version allows users to group a large number of files on disks according to meaningful categories, to perform a program task while printing, to print graphics from the screen, and it is structured to allow the user to add future devices as they become available. In addition, the new version of MS-DOS supports a RAM disk driver for additional safety and ease-of-use as well as a Librarian programmer's utility.

The ability to group files in meaningful categories is particularly useful on Winchester disks, which can contain hundreds of files, and is also convenient when organizing data on diskettes. The background print capability allows the user to be working in a program such as EasyWriter II, and print files at the same time; the graphics print-screen capability allows users to print graphics and text from the screen to an attached printer such as the OMNI 800(tm) Model 850 or

Model 855 microprinters.

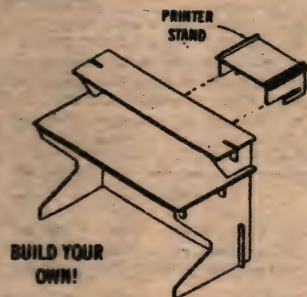
The TI version of MS-DOS 2.1 supports a software emulator that provides an increased level of compatibility with the IBM version of PC-DOS 2.0.

MS-DOS 2.1 was made available for the TI Professional Computer Family through existing outlets for TI Professional Computers in February. Suggested retail price is \$75.00.

For further information contact Texas Instruments, Data Systems Group, P.O. Box 402430, H-697, Dallas, TX 75240 or call 1-800-527-3500.

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TI Announces Memory Upgrade Kits For TI Professional Computer

Texas Instruments has announced two new memory expansion kits for the TI Professional Computer Family for customers who want to expand memory beyond 256K bytes. The new kits increase main memory up to 768K bytes in 256K byte increments.

These larger memory capacities enhance the use of sophisticated software such as dBase II(tm), PFS:File(tm), and Lotus 1-2-3(tm). It also increased the performance of state-of-the-art software packages such as MS(tm)-Windows, TI's Speech Com-

mand(tm) system and NaturalLink(tm) software to the Dow Jones News/Retrieval(R).

The new memory expansion kits use TI's own production-proven TMS4164 64K dynamic RAM. The first of the new 256K memory expansion kits contain a full-size board that occupies one of the five expansion slots in the TI Professional Computer. The second kit contains a smaller board that attaches to the first board.

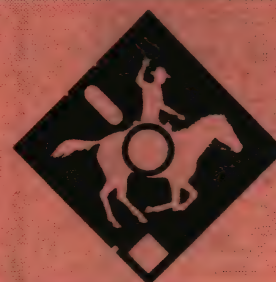
The suggested retail price for the first 256K expansion kit is \$795, and the kit includes an

installation manual and a diagnostic diskette. The suggested retail price of the second 256K expansion kit is set at \$695, and the kit includes an installation manual.

These new products were made available in December 1983 from existing outlets for the TI Professional Computer Family.

For further information contact Texas Instruments, Data Systems Group, P.O. Box 402430, H-693, Dallas, TX 75240 or call 1-800-527-3500.

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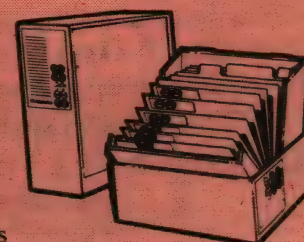
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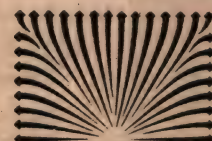
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Texas Instruments Announces 3270 SNA Communications Support For TI Professional Computer Family

Texas Instruments has announced a new software emulation package that allows any member of the TI Professional Computer Family to act as a remote terminal to an IBM or IBM-compatible SNA (System Network Architecture) mainframe computer. The software allows all TI Professional Computer models to emulate a standard IBM 3276 Model 12 control unit/display station with a 3287 printer.

The 3270 is IBM's most widely used inquiry terminal. Members of the TI Professional Computer Family give users the advantage of a personal computer, the communications flexibility of a SNA interactive terminal, and the application programs plus data found only on mainframe computers. Data transmission via telephone lines occurs at a maximum 4800 bits per second on a switched line at 9600 bits per second on a leased telephone line.

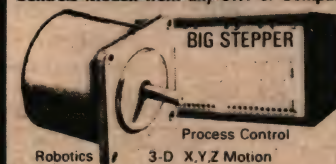
A TI Professional Computer requires a minimum of 128K bytes of memory and a synchronous/asynchronous communication card with an external modem to run the emulation. The 3270 SNA package will include the software on a floppy diskette plus a user's manual.

The 3270 SNA will run under MS-DOS on the TI Professional Family and will have a suggested retail price of \$675. It was made available through existing outlets for the TI Professional Computer Family in February 1984.

For further information contact Texas Instruments, Data Systems Group, P.O. Box 402430, H-695, Dallas, TX 75240 or call 1-800-527-3500.

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Atari Software Reviews

by Jeff Brenner

Price:

\$29.95

Manufacturer:

MicroProse Software
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Program Name:

Floyd of the Jungle
Version II

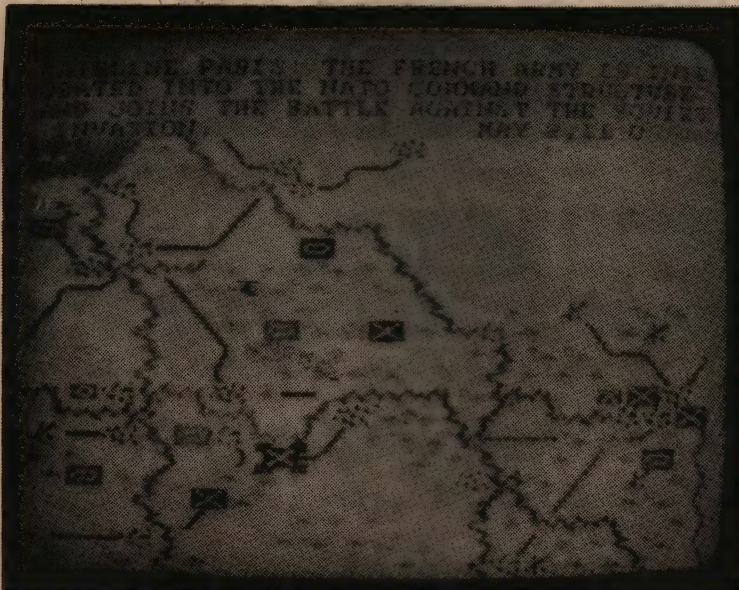
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one. You must rescue some seemingly helpless character from the depths of high resolution evilness by jumping, climbing, and avoiding dangers. However, Floyd of the Jungle is unique in many respects to Donkey Kong, Kangaroo, Jungle Hunt, and countless other rescue-type games. Perhaps the most exciting feature of this game which sets it apart from the others is its four player capability. Up to four Floyds can compete simultaneously (on the 400 and 800 computers only; a maximum of two players on the XL computers) to make for an extremely exciting game. If you don't have four players, the computer will automatically control the other Floyds. This is a great feature for beginners when learning how to play the game, but skilled players will find the computer-controlled Floyds unchallenging.

The game starts by asking the number of players and each player's name. The names are displayed with the scores, thus creating a more personalized effect than the traditional

"PLAYER 1,2,3,4." The computer-controlled Floyds are given the names Harpo, Groucho and Chico. Next, you can select one of three skill levels; easy, medium or tough. On the easy level, the game starts with the first screen, and the action is relatively slow. On medium and tough, the game starts on the second and third screens, respectively. In addition, the game is faster on

Continued on page 106

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Atari Reviews Continued from page 105

the higher levels. Any player can give himself a handicap

before the game begins. The handicap can be either one or two sore legs. The greater the handicap, the slower your Floyd moves, so a beginner can compete against a more ad-

vanced player.

When the first screen appears, you find yourself in a vertically organized jungle, with three other Floyds and a trapped jungle woman, Janice,

at the top of the screen. The object of the game, as you might have guessed by now, is to save Janice before the other Floyds do, or before the time limit. To reach Janice, you must climb vines while avoiding a wide variety of jungle hazards, including pygmies who shoot poison darts, crocodiles, elephants, lions and tigers. You can also ride the jungle animals if you are careful not to be eaten by a crocodile or stampeded by an elephant. Each time you are hurt by a hazard, you are returned to the bottom of the

screen.

Before you reach Janice, you can capture rare jungle birds or punch out pygmies for extra points. However, I found that attempting to get these extra points takes up too much time. Therefore, you should only go for these points if you are very much ahead of your opponents. One point is awarded for each bird captured, two points for each pygmy knocked down, and four points are

Continued on page 108

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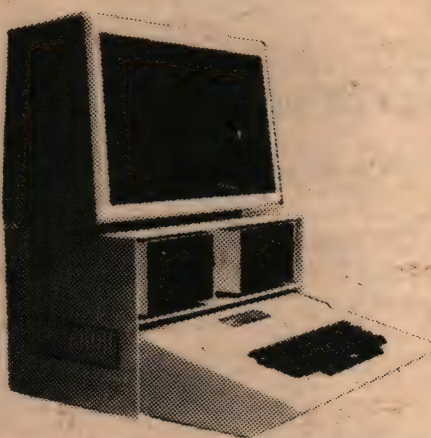
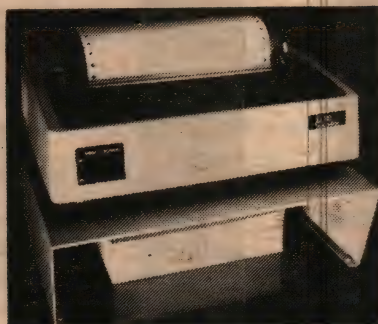
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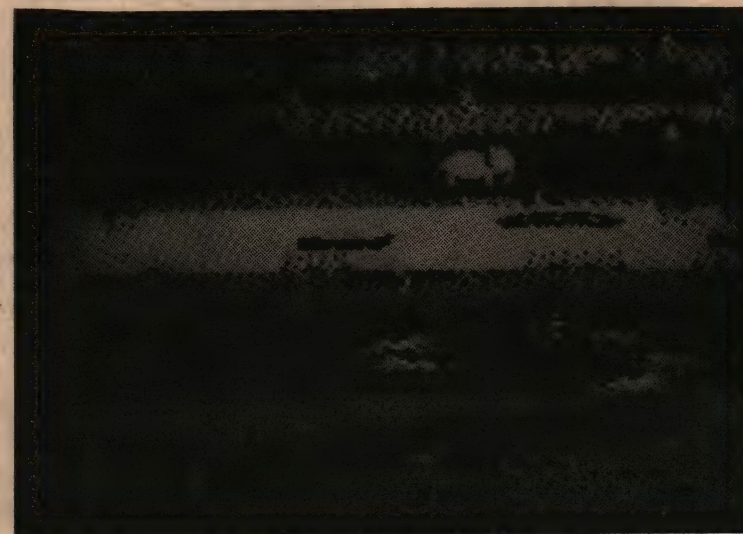
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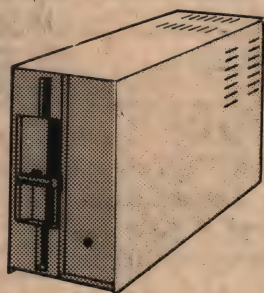
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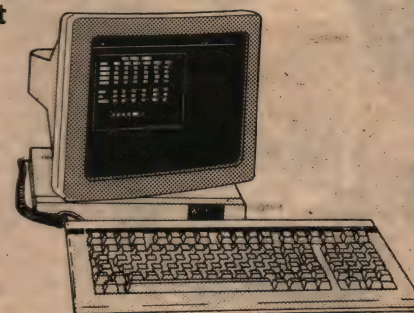
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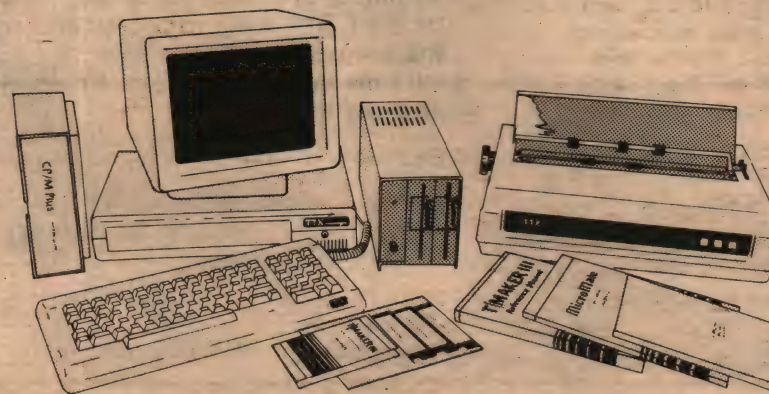
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Atari Reviews Continued from page 106

awarded for reaching Janice first. If you save Janice in less than 60 seconds, or with a handicap, you are given additional points.

After Janice is saved from a screen, all players are shown their scores and the game advances to the next screen.

There are a total of five screens. The player with the highest score at the end of the game is the winner.

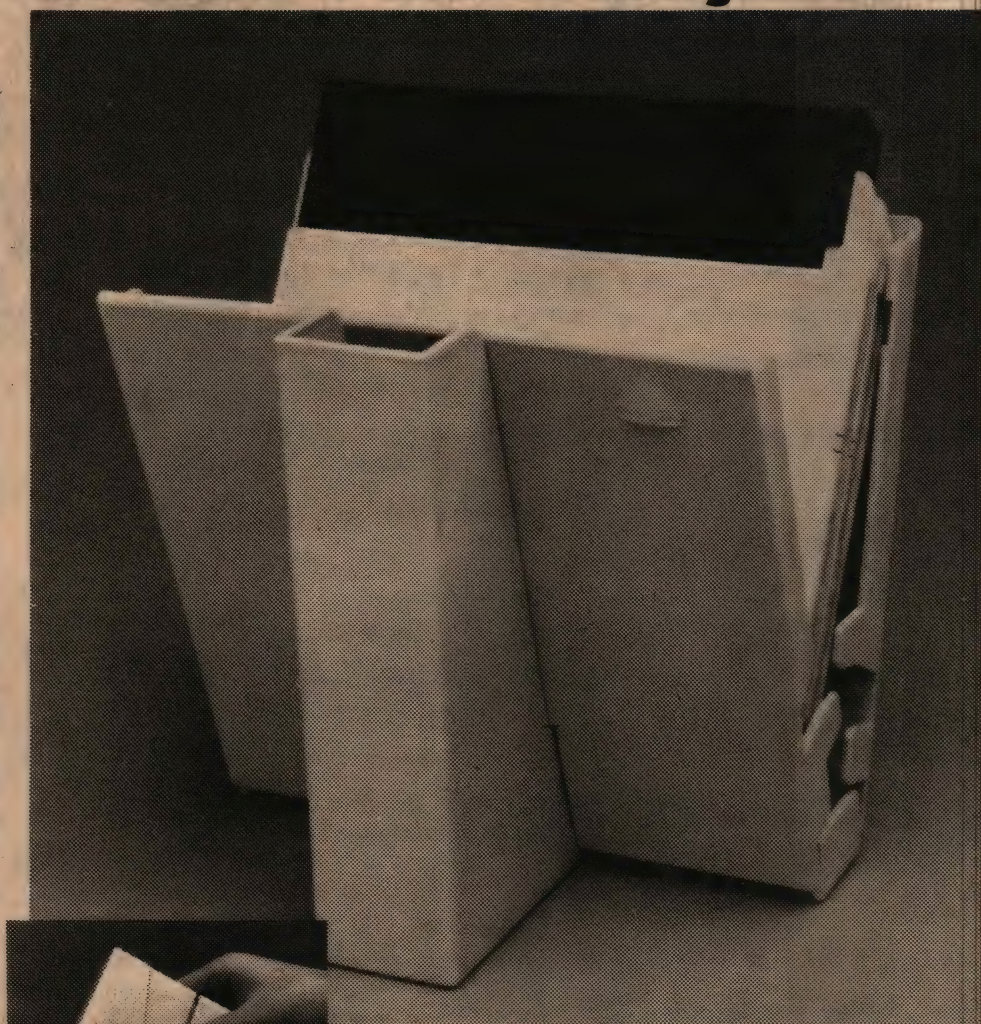
The graphics, music and game play of Floyd of the Jungle make it a fun game. The game's excitement is greatly enhanced by its four player capability. Therefore, Floyd of the Jungle makes a terrific family or party game, and I

highly recommend it as such.

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Nato Commander is an exciting, real-time war simulation, similar in style to the popular war game, Eastern Front. In this game, you are the commander of the NATO forces during a Soviet Bloc invasion of Europe. The NATO armies oppose attacks by the Warsaw Pact forces. Your goal is to defeat the communist forces and save Europe from destruction.

One particularly attractive feature of this simulation is that it lets you select one of five scenarios to play:

1. Surprise Attack
2. Hannover/Hamburg
3. Pre-emptive Strike

4. The Italian Option
 5. The Battle of Germany
- There is also a demonstration scenario. Each of the five scenarios offers opportunities for different strategies. If you wish to play offensively, you would play the Pre-emptive Strike scenario. If you wish to play defensively, you would play the Hannover/Hamburg scenario. After a scenario is selected you must choose one of four skill levels: easy, moderate, difficult or impossible. You also can select divisions or brigades as a unit size for your armies. Divisions are more powerful than brigades and are more easily controlled. However, brigades let you plan more complex strategies.

When the game begins, a

Continued on page 110

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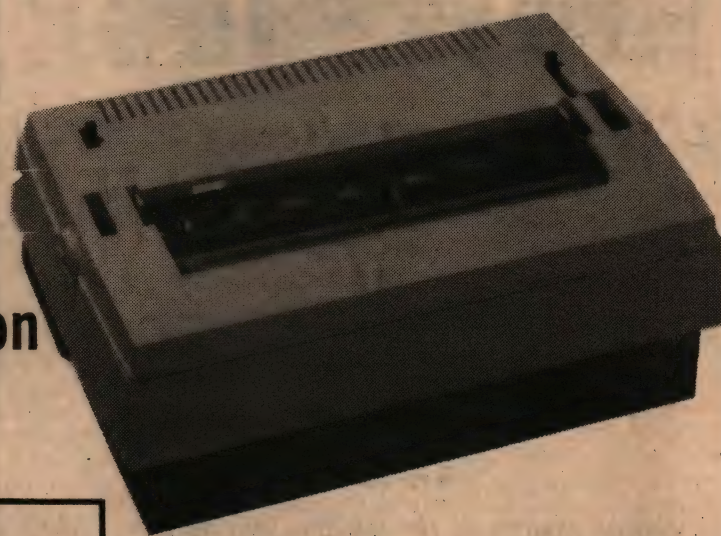
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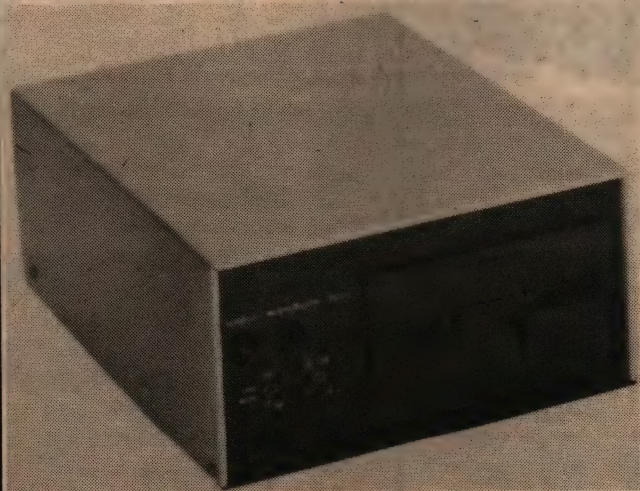
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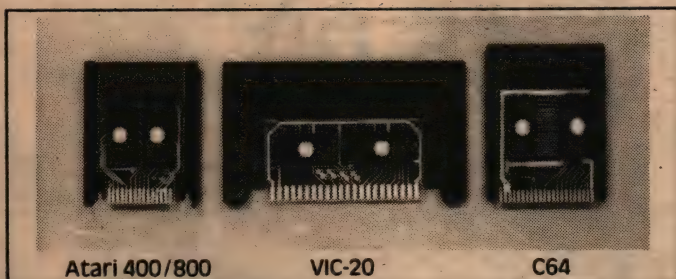
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Atari Reviews Continued from page 108

section of a map of Eastern Europe is displayed, showing

the terrain of the area and the army units. The army units in this game are as follows: Mechanized Infantry, Armor, Armored Cavalry, Airborne, Militia, Helicopters, Air

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Wings, Surface-to-Air Missiles, and Tactical Nuclear Missiles. Each unit is represented by a different symbol. Colors are used to distinguish one force from the other. American, British and French units are blue, West German units are black, and Dutch and Belgian units are green. The Warsaw Pact units are red. You can control all units (except the Warsaw Pact units) by moving a cursor with a joystick or with the arrow keys on the keyboard. The map scrolls smoothly to reveal new sections when the cursor reaches the end of the screen. The entire map encompasses approximately four screens. Each unit on the map is commanded through the keyboard. Depending upon the type of unit under the cursor, you can command it to move, attack, give ground support, or prepare a defense. When the conflict becomes serious, and only when you receive permission from the President, you can launch nuclear missiles. As the

game progresses, teletype and radio broadcasts such as "WESTERN COMMUNIST PARTIES TODAY DENOUNCED SOVIET AGGRESSION IN WESTERN EUROPE" appear on the screen to create a realistic war atmosphere. In addition, at the end of each day a status report is given detailing the events that occurred throughout the day, and the overall conflict situation.

NATO Commander can progress for up to several hours, until one side is defeated. The game can be interrupted at any point and be saved to disk for later retrieval. You can use the save/load feature of this game to test out various strategies since you can load in a saved scenario any number of times and apply new tactics.

The only major criticism of NATO Commander concerns its instruction booklet which consists of seven miniature pages and a summary sheet. For such a complex simulation,

I would like to have seen a much larger, more detailed manual. A beginner at war simulation games would probably be lost and confused with the little documentation provided. However, the game itself is intense and realistic. The many scenarios and skill levels present a constant challenge, thus making NATO Commander an excellent choice for the enthusiastic war game player.

Program Name:

Safe-Guard Plus

Requirements:

Cassette-16K
Disk-16K (manual recommends 24K)

Price:

\$45.00

Manufacturer:

Midwest Computing
4975 Brookdale
Bloomfield Hills, MI
48013

Safe-Guard Plus is a utility program for making backup copies of machine language programs. In addition to making disk to disk copies, this program can also copy cassette to cassette, cassette to disk, and disk to cassette.

When the program is run, a menu displaying the copying options appears. You use one key commands to select the operation you desire.

Upon testing of the different copying operations, I found that the Cassette to Cassette and the Cassette to Diskette options were the only reliable ones. This program can not copy copy-protected disks. Since most of today's software is highly protected, the Disk to Disk and Disk to Cassette options are worthless. Out of eight programs I attempted to copy, none was successfully duplicated. In addition, the program suddenly hung up several times for no apparent reason while I was using it. I discovered that even DOS was more reliable and easier to use to duplicate disks than this program.

For a duplicating program that can only copy cassettes reliably, the \$45.00 price is quite outrageous. Without further comment, I recommend that potential buyers of this program look elsewhere. ●

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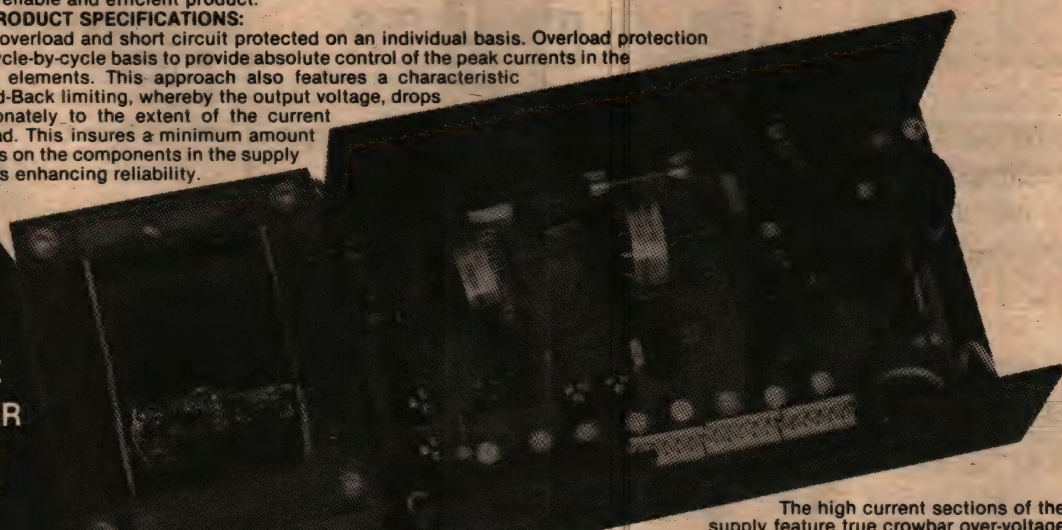
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Blue Max employs a diagonally scrolling playfield distinctly reminiscent of Zaxxon. Your plane starts at the lower-left hand corner of the screen on a runway as a stirring rendition of 'Hail, Brit-

tanial' begins. After taxiing and attaining the necessary speed, pull back on the joystick and - you crash. Huh? Well, Synapse, for some reason, assumed that most people would be comfortable with a push forward-plane goes up, pull back-plane goes down arrangement. Maybe this is the case, but I've played enough flight simulator type games to know how a real plane works, and that ain't it. Fortunately, the user has the option for 'Reverse Control' which will set things the way they're supposed to be in the first place. Even Synapse admits in the manual that most aircraft are flown using reverse control.

But once you get that straight, a real challenge begins. Just like real life, you have only one plane, and if something happens to it...press START and begin from the

beginning. This tends to make one a bit more cautious than in the usual shoot-em-up type game.

As the landscape scrolls under you, take a look at your

control panel, because it has a lot of information that you need. If the background is brown, your plane is at strafing altitude, and if it's flashing yellow, you're too low, pull

up! Also your altitude, fuel left, bombs left, speed and

Continued on page 112

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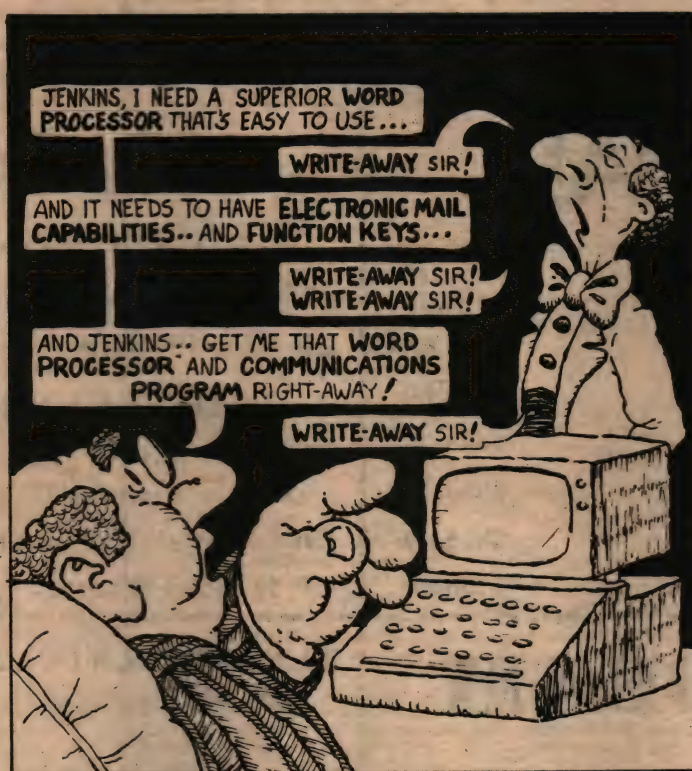
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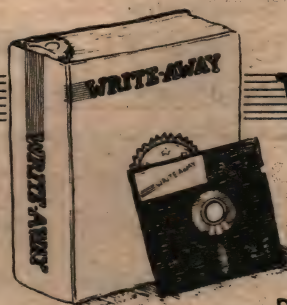
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Blue Max

Continued from page 111

score are displayed. If an enemy plane is approaching, you'll hear a beeping noise, and a 'P' will appear. If a red asterisk also appears, the plane

is above yours. These planes can either come at you from the front, or overtake you from the rear, and shoot at you. The background of the control panel turns blue if your plane is at the same altitude as the other. These enemy craft have no compunctions against ram-

ming you. It's particularly maddening to have one ram you from behind before you even realize that it is there.

One short beep and a 'R' means that a runway is approaching: press the fire button to lower your landing gear and the 'R' turns to a 'L'. Landing

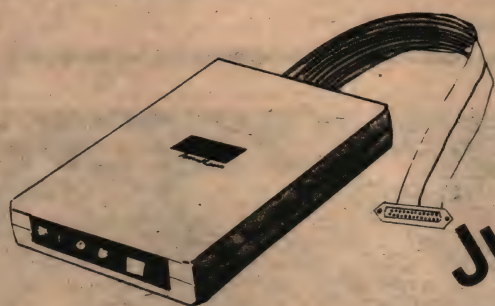
will quickly prove to be an art that must be mastered, for landing too far down the runway will make it impossible to take off again. While stationary, any damage that your plane has taken will be repaired, and your supply of fuel and bombs replenished. As this happens, enemy planes will cruise by and drop bombs. I haven't been hit by one of these...yet.

Also, during your flight, you may incur damage to your craft. This is represented by a 'F' for a fuel leak, a 'B' for bomb gear damaged, a 'M' for decreased maneuverability, and a 'G' for machine gun

damage.

A 'W' signifies that a wind is present. The wind causes your plane to drift in one direction or another, including up and down, and makes it difficult to go in the opposite direction. This can be quite frustrating, especially if you have a 'M' damage marker.

As you fly, you'll pass over a river with ships both still and moving, bridges, anti-aircraft batteries, buildings, roads, cars, and hangers. Shoot or bomb everything. The graphics and play action are great, and it is a challenge to keep from being shot down. ●



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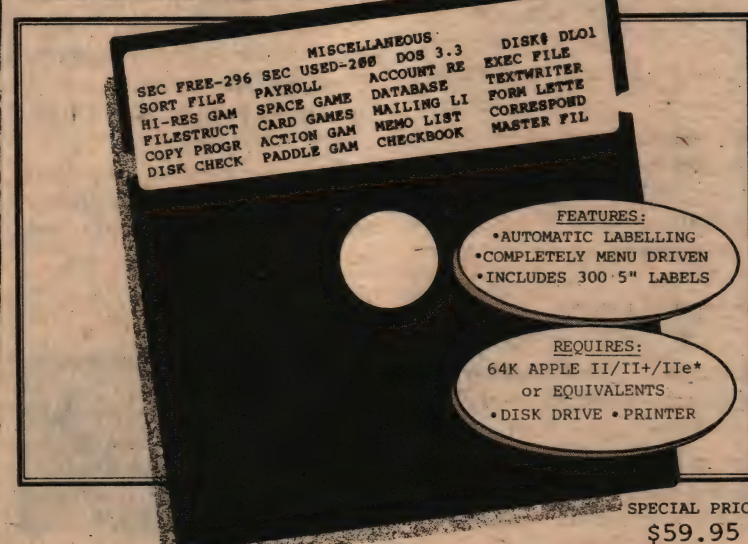
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Drelbs For The Atari

by R.E.DeVore

Name: Drelbs
 Equip: Atari Computer
 48K, disk drive
 joystick
 By: Synapse Software
 5221 Central Avenue
 Richmond, CA 94804
 415-527-7751

If you're the type of gamer that enjoys difficult games, this

one may be for you. It is undeniably difficult.

The object of Drelbs is to direct your on-screen persona, a large eye with feet, about various dangers and perils and free the rest of his enslaved race. This game abounds in strange nomenclature, so pay attention: the evil Trollaboars have invaded the Atomic Flip Grid to capture the last Drelb. If your man can elude them and the Screwhead Tank, you can enter the Dark Corridor where the Gorgolytes have im-

prisoned the rest of the Drelbs. I didn't have much success understanding the game by reading the instruction booklet.

The title screen shows the Drelbs logo and plays a vigorous, but repetitive tune. When you press START, the main game field appears. A number of gates, hinged in the middle, occupy the center of the screen, and your Drelb is at the top. When you run against a gate, it rotates 90 degrees. In this way, you can manipulate four gates to form a square, which is the point here. But it's not that easy, of course. Pursuing you are the aforementioned Screwhead Tank and Trollaboar. The tank constantly circles the area slowly and fires bullets. These bullets will bounce off of the gates and may pursue a wildly careening path over the screen. Touching one of the missiles or the tank proves fatal to the Drelb.

The Trollaboar is a square face that is after the Drelb. The Trollaboars may flip gates

and ruin your designs, but the Drelb has a defense. If it can form a square with the Trollaboar inside, the monster is trapped for about 15 seconds.

After the Drelb has completed a certain percentage of the possible squares, interesting things start happening to them. A nasty scowling face indicates a Gorgolyte is looking in from the Dark Corridor, but it can't hurt you unless the Drelb runs into it. A beautiful woman's face may also appear, in which case you wish to run into her, because that jumps you to the Dark Corridor screen. If you miss the lady, you can still run into a square that shows many Drelbs and achieve the same effect.

When you do get through the Dark Corridor, you will see your compatriot Drelbs held immobile by evil magic. Just run over them and they will be free. Once again, your task is not without complications, for a Gorgolyte patrols this area. An understanding of the

monster's method is necessary for success. It will move toward you, and fire a shot up, down, left or right, depending on which direction will come closest to hitting you. Only one missile appears at a time, leading you to think that all you have to do is to wait until the thing fires, and then dodge in and free a Drelb. Unfortunately, there is a slight delay on the joystick that makes this more difficult. If you are hit by a missile, or the Gorgolyte, you return to the grid to try again. On the other hand, if you succeed, you get to go to the next grid, with TWO Trollaboars. Which is tough, in both senses of the word.

This game is no pushover. I've gotten to the second grid once and lived for about 30 seconds. It's difficult to plan flipping those gates while being pursued, and with two enemies, there usually isn't a corner to hide in. Synapse says that there are eight levels, but I'll never be able to prove it. Rate this game good but hard.

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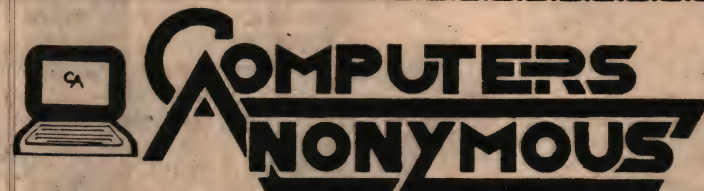
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Pinball Construction Set For The Atari

by R.E. DeVore

Name:

Pinball Construction Set

Equip:

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48K, disk drive
joystick

By:

Electronic Arts
2755 Campus Drive
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415-571-7171

Over the last few years, several computer pinball games have been released, causing aspiring programmers to gnash their teeth in respect and envy for the skill that can simulate such a complex set of interactions. But now the Pinball Construction Set lets everyone who can point a finger design a pinball game to their exact specifications.

When Pinball Construction Set is first loaded, a blank play

area is displayed to the left, a large assortment of objects you'd expect to find in a pinball machine are displayed on the right, and a flickering hand appears at the upper left corner.

To place an object on the playfield, move the hand to point at one of the pinball objects on the right (called "icons"), and press the joystick button. The hand will "pick-up" a copy of the icon, and you may now move it wherever you like. Releasing the button drops the icon on the field. If the icon is not over the playfield, it disappears. This makes it handy to eliminate

unwanted features in your game, just pick up the offending icon, carry it to the right, and drop it.

After you've put a few bumpers, spin targets, Knock-downs and the like, you can see how the play action is coming along. Put a ball on your playfield somewhere (usually over the launcher), and point to the flipper icon on the right. Play now begins for one ball. The joystick controls the left and right flippers. One problem here is that more than one right or left flipper slows down the flipper's reaction time rather noticeably, although not the ball's.

When you lose the ball, press SELECT to return to the main display, and make whatever changes you feel necessary.

You can also put chunks of solid border material in the playfield anywhere you wish. A few objects called polygons exist for this purpose. In fact, the playfield border that you start out with is a polygon. The hammer, scissors, and arrow icons to the right are designed for working with polygons. Move the hand to point at the arrow and press the button, and a number of white dots appear around any polygons on the playfield. Move the arrow to point at one of these dots, called knobs, press the button,

and you can move the knob and change the shape of the polygon it is attached to. The scissors icon eliminates knobs and the hammer adds extra ones.

After you've put in the bumpers and polygons, you can adjust the scoring values associated with hitting each object and multi-object bonuses. Select the AND gate icon and a number of three-input gates appear with a new set of icons to the right, a screwdriver and a wire cutter. Use the screwdriver to connect an object to a gate and the cutters to disconnect it. You can also set the multiple score bonuses and the sounds that objects will make at this point.

Then, if you're not playing your creation by now, you can paint the background and polygons using the magnifying glass and paintbrush.

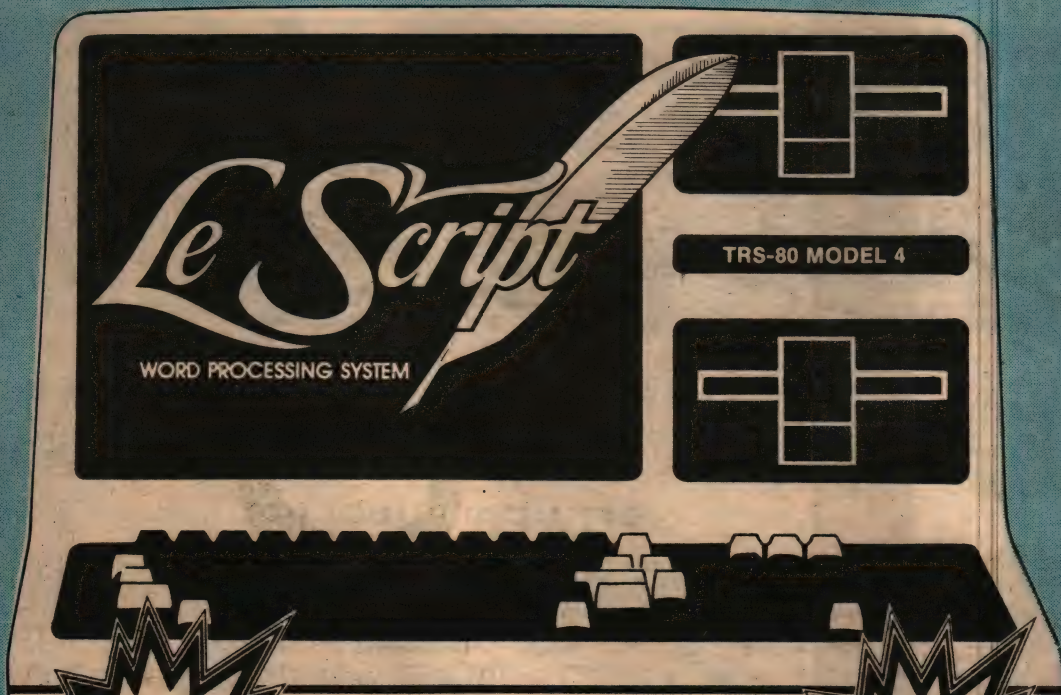
When your design is complete, you can save it on disk, or create an auto-booting diskette. Five demonstration games come with the Pinball Construction Set, although a couple of them have slight flaws that will result in a ball being endlessly trapped if it hits the wrong area.

This program represents an immense programming effort. At the cost, this program is a great value, and I can recommend buying it.

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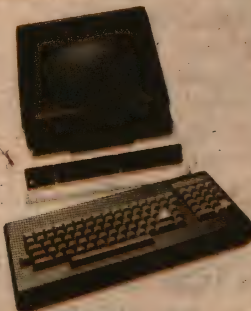
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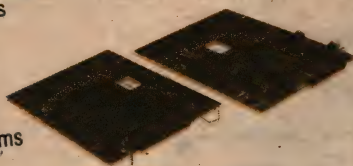
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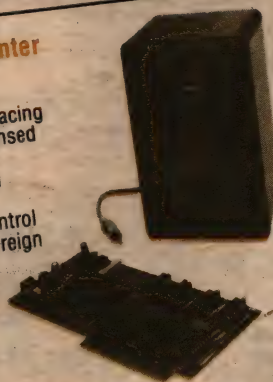
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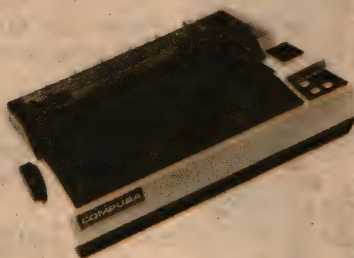
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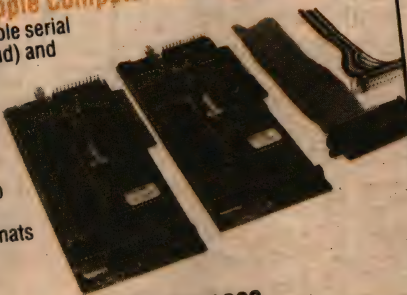
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Activision Announces River Raid™ And Kaboom!® For The Atari Home Computers

Introducing its first home computer software titles, Activision, Inc., has announced the release of two of its best selling classics for the Atari line of home computers.

River Raid and Kaboom!, both of which have sold more than one million units in their original designs for the Atari 2600, was made available in October and carry a suggested retail price of \$34.95.

The new adaptations of River Raid and Kaboom! use the increased power and memory of Atari home computers to display significantly enhanced graphics and sound effects.

River Raid, designed and adapted by Carol Shaw, retains all of the features of the original game, which is still listed in the top ten on the video game charts. Using the

Joystick Controller, the player pilots a B1 Strato-wing Assault Jet over a constantly changing, danger filled river course. But Shaw has added several new elements to heighten the adventure on the Atari home computers. For example:

- New Obstacles: hovering hot-air reconnaissance balloons and panzer tanks that prowl the riverbanks;
- Attacking enemy: the helicopters and tanks shoot back;
- Vivid river canyon graphics and cacophonous battle sounds to heighten the sense of realism;
- Immediately challenges both the beginner and the expert: advanced players can select more difficult river sections;
- An expanded control panel that displays the last highest

score and bridge the player is attacking;

- A pause feature to stop the game in mid-stream.

BASIC GAME MECHANICS

OBJECT:

The object of the game is to score as many points as possible by destroying enemy ships, helicopters, fuel-tanks, jets, hot-air balloons, tanks and bridges before your jet crashes or runs out of fuel.

PLAYERS:

One or Two.

GAME SELECT:

Advanced players may start at later bridges, bypassing the easier sections of the river. Press the OPTION or SELECT key to select game number.

GAME #	STARTING BRIDGE	# OF PLAYERS
1	1	1
2	1	2
3	5	1
4	5	2
5	20	1
6	20	2
7	50	1
8	50	2

TO BEGIN:

After game selection is made, press START key. Action begins when you move the Joystick

JOYSTICK CONTROLLER:

To fire, press the red button. Hold for continuous fire.

To bank left or right, move the Joystick left or right.

To accelerate, push Joystick forward.

To slow down, pull Joystick back.

JETS:

You'll begin with four jets (1 active, 3 on reserve.) With each 10,000 point increase, an additional jet is received. A jet is destroyed when it touches anything except a fuel depot, or the brown river bank, or if it runs out of fuel. Game ends when all of your jets have been destroyed.

SCORING:

Ship	30
Helicopter	60
Balloon	60
Fuel Depot	80
Jet	100

Continued on page 122

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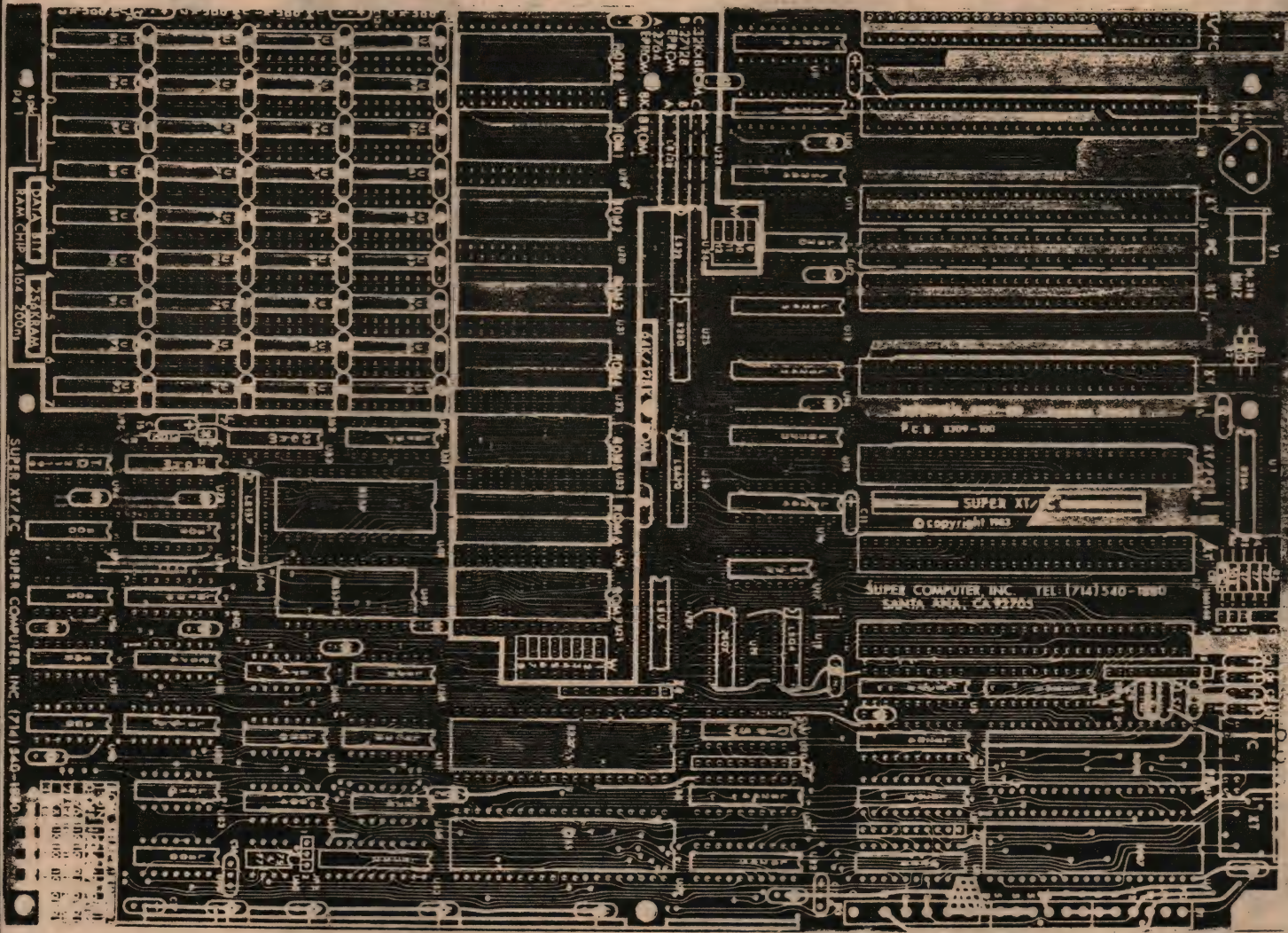
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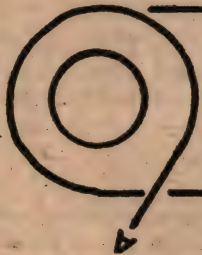
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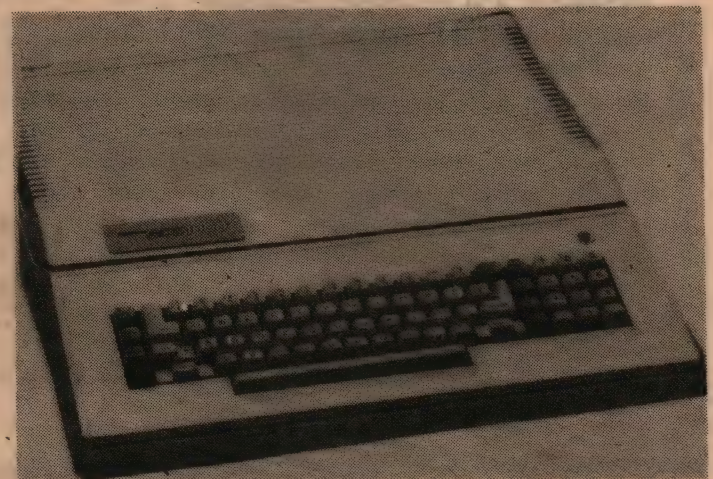
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Activision

Continued from page 118

Bridge 500
 Bridge with Tank 750

CLUB NAME:

River Raiders

CLUB SCORE:

35,000 points at game 3.

Kaboom! originally designed by Larry Kaplan and

adapted for the Atari home computer by Paul Willson, has won numerous game awards, including Omni magazine's choice as one of the 20 Best Games of 1981--the only video game so honored.

As in its original version, Kaboom! for the home computer features the Mad Bomber, a scowling cartoon convict who roams the rooftops

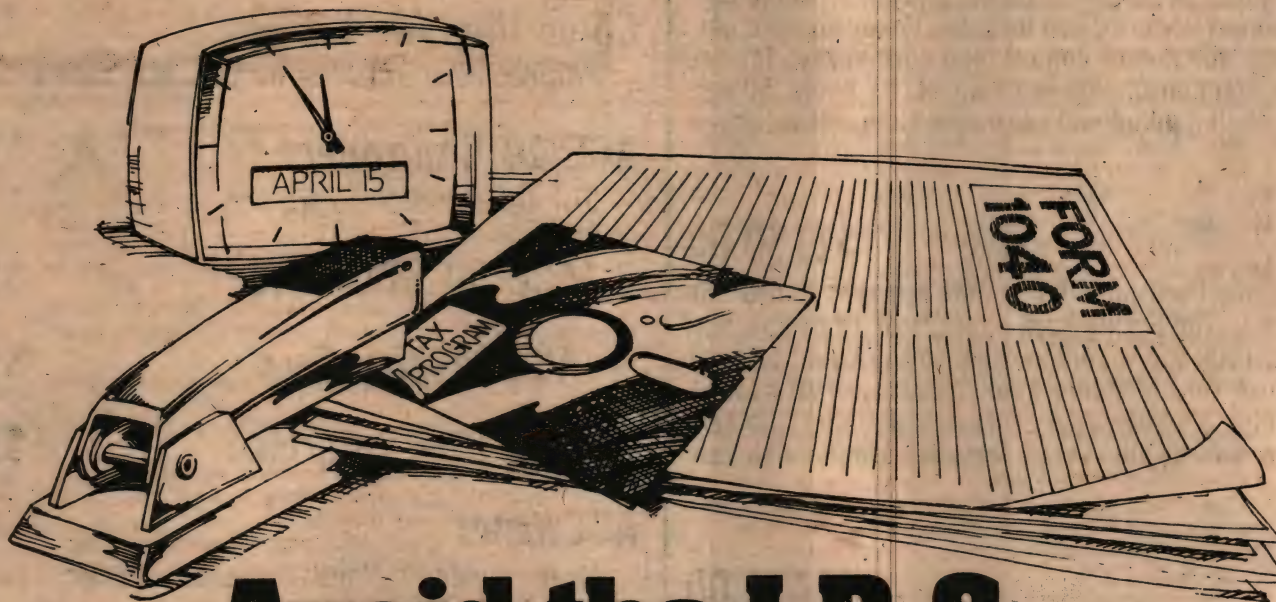
dropping bombs with lighted, crackling fuses. The player, maneuvering water buckets with either the Joystick or paddle controller, tries to catch the cascading bombs, foil the Mad Bomber's scheme and score points.

But Willson has added several features to enhance Kaboom!'s furiously exciting game play. For example:

- A "Pitch and Catch" variation on which players can take turns in being the Mad Bomber or catching the falling bombs, making Kaboom! one of the first true two-player home computer games;
- The score of the 1812 Overture: as the bombs hit the buckets they recreate the

famous musical theme;

- A grinning Mad Bomber: the cad who has always frowned when the player catches bombs, now smiles sardonically when the player misses;
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OBJECT:

The object of the game is to score as many points as possible by catching bombs dropped by the Mad Bomber in your water bucket.

PLAYERS:

One or Two

GAME VARIATIONS:

There are three game variations:

1. One player vs. Mad Bomber.
2. Two players taking turns

Continued on page 123

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Activision

Continued from page 122

vs. Mad Bomber

- Pitch and Catch - two players alternating roles of playing the Mad Bomber (dropping the bombs) and playing the buckets (catching the bombs).

The SELECT key on the computer is pressed to select game variables 1-3.

BUCKET SIZE:

The size of the water buckets

CONTROLLER:

Can be changed from large to small by pressing the OPTION key. Additionally, the OPTION key is also pressed to choose the controller option: Joystick(s) or Paddle(s).

Bucket Size	Controller
Large	Paddles
Large	Joystick
Small	Paddles
Small	Joystick

When two players play the game, both players must use paddles or Joysticks. One player cannot use a Joystick while the other uses a Paddle. However, the bucket size can be different for each player.

TO BEGIN:

After selecting game variations and options of bucket sizes, press the START key. The Mad Bomber starts dropping bombs when the red action button is pressed by the

player controlling the water buckets.

JOYSTICK CONTROLLER:

To move the buckets or the Mad Bomber (if playing Pitch and Catch) left and right, move the Joystick left and right.

PADDLE CONTROLLER:

To move the column of buckets or the Mad Bomber (if playing Pitch and Catch) left and right, turn the paddle dial

counter-clockwise and clockwise.

SCORING:

Only the player "catching bombs" earns points. Each time you catch a bomb in one of your buckets of water, you score points. The point value of each bomb depends on how fast it is falling and which wave "group" the bomb is in. There are 8 separate groups of bombs, as shown by the

following chart.

KABOOM! POINT SYSTEM

Continued on page 124

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Activision

Continued from page 123

Number of Bombs	Number of Bombs Caught	Point Value of Each	Point Value Cumulative
Group 1	10	1	10
2	20	2	50
3	30	3	140
4	40	4	300
5	50	5	550
6	75	6	1000
7	100	7	1700
8	150	8	2900

After a player catches all the bombs in level 8, all the bombs that follow will fall at the same rate and are worth the same points as bombs in level 8.

LOSING

A BUCKET:

When you lose a bucket by missing a bomb, the remaining on-screen bombs explode. The next wave of bombs dropped for that same player will come

from the previous bomb group.

The new bombs will fall at the rate of the previous bomb group and score the same as the previous bomb group. The only difference is that there will only be 1/2 as many bombs to fall.

REPLACEMENT BUCKETS:

For every 1000 points you score, you will be given a new

bucket - only if you have lost one or two already. You may never have more than three buckets on the screen at the same time.

END OF GAME:

When a player loses all three buckets, KABOOM! ends. The player can then register his/her initials on-screen by turning the paddle dial or moving the Joystick. A picture of the type of controller used is also

displayed. The screen will display the three highest scores at the conclusion of each game. If a player scores higher than any of the previous 3 high scores, then the players initials, score and a graphic picture of the type of controller used will be registered on-screen, effectively eliminating the lowest of the 3 previous high scores.

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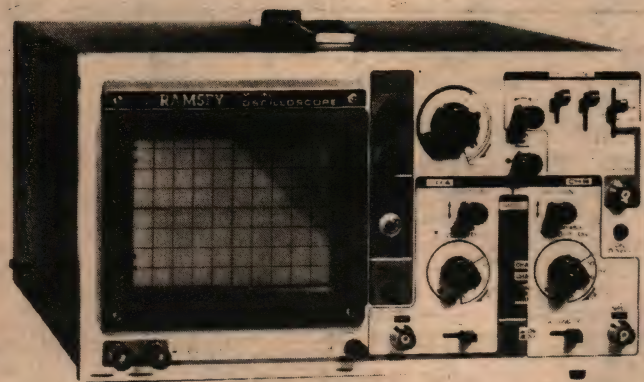
Bucket Brigade
CLUB SCORE:

3000 or more points in game variation 1 or 2 if using a paddle. 2400 or more points in game variation 1 or 2 if using a Joystick. You cannot enter the club by playing "Pitch and Catch" game variation.

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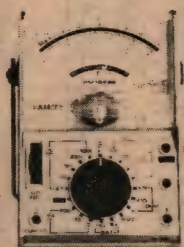
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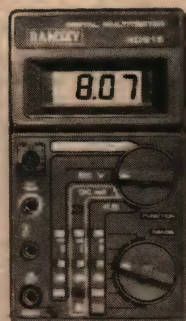


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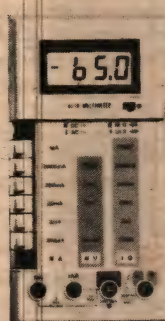


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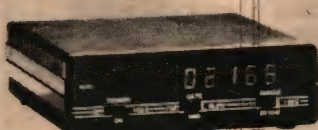
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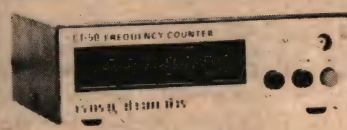
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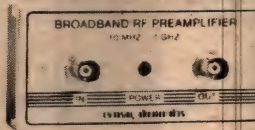
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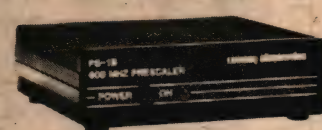
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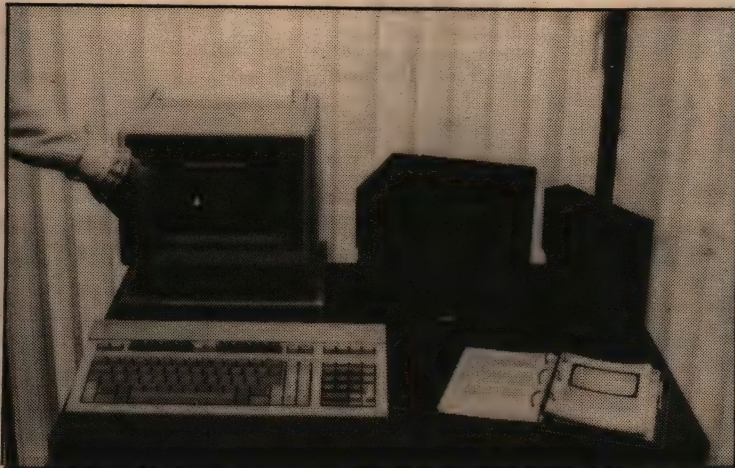
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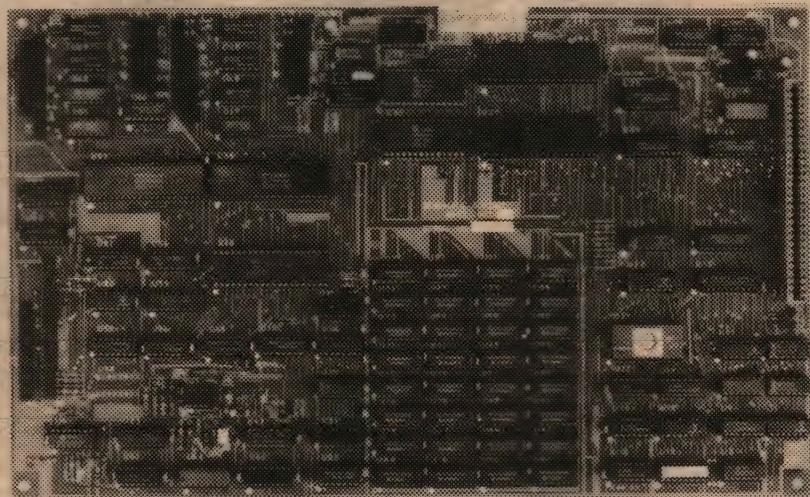
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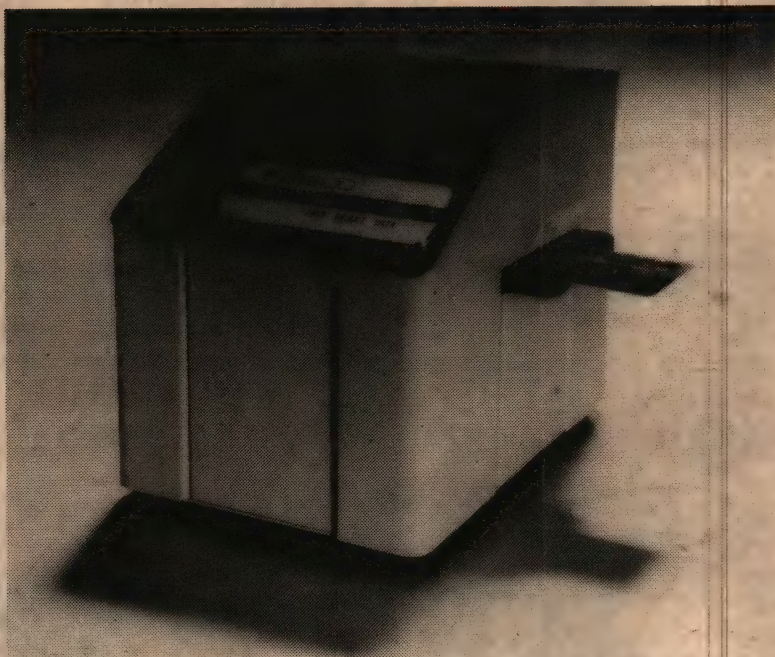
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TRS-80

The Computer I Bought For Christmas

by R.K. Fink

I looked around for a long time before I finally bought my 14 year old daughter a personal computer. Check these spec's for a moment and see what a price you would expect to pay for a computer that offered them as standard...

1. 16K of User RAM plus 16K ROM BASIC with a Hi Res command structure and a Microsoft Basic as powerful as enhanced Disk Basic in other machines.
2. An RS-232 Port
3. An analog to Digital Converter and 2 ports.
4. Ability to install 64K chips for about \$40.00.
5. Full stroke keyboard with a layout like Model I & III's.
6. Cartridge port for disk expansion.
7. Really educational and "fun" UserManuals good for adults or kids.
8. Several sources of monthly information on internal ROM organization and the "secrets" of the machine's operation.
9. A company behind the machine that will be here next Christmas!

If you said a little over \$200 then you must have found the Radio Shack Color Computer II. I searched all the middle market micros for my daughter's Christmas present and could find no other system that offered as many built in features and was as compatible with our conventional programming objectives (Microsoft Basic) as this COCO II. It's a real sleeper!

Some first impressions....

The COCO II is an upgraded Color Computer from Radio Shack with newer memory chips (2118) which needs only 5 volts. The case is smaller and more pleasing plus

the keyboard is a real full stroke and not the "chiclet" keys.

The Microsoft BASIC ROM has been cleaned up to allow 8 bit graphics to be sent to the RS-232 port along with other firmware changes that will still allow program compatibility with the original COCO.

The amazing feature, to an old Model I user, is the power of this standard BASIC. Commands like DEF FN, INSTR, DEFUSR(1-9) and the ability to "route" output to printer, tape or disk with simple syntax changes are a credit to Microsoft's improved ideas. Utility commands are great too. You can call Machine Language (or ROM) subroutines with EXEC. There's the ability from BASIC to save any area of memory as an executable machine language program with CSAVEM "Start,End,Entry". Just like having a built in Monitor while in BASIC!

Tape input is finally reliable due to a technique of Frequency Shift Keying two tones instead of the old Model I data and clock pulses. The baud rate is three times as fast as 1500. If you recall the old Model I tape dilemma you'll be amazed at the reliability of this system.

I began to convert some of our best programs to COCO Basic from the Model I and had to adjust to the 32 wide

text screen versus 64. Other than that, most straight Basic programs can be manually converted and then improved through the use of color graphics and Sound. The Graphics blocks are now 8 color so recoding is required. Sound is not only a "bit" oscillator but can use four voices for harmony through the "Play" command.

The High Resolution commands of DRAW, CIRCLE, PAINT, GET & PULL will blow your mind! When you have the time to really master the unlimited power of these you'll see that a few lines of Color Basic can do what would have taken whole pages before.

Other than simple syntax changes in some commands, any Microsoft user will be off and running. The User Manuals provided are very well written and are fun for a Kid or are a useful teaching aid for any owner.

Some Tid-Bits to watch out for...

If you wish to use any of the original Color Computer Software (Tape or Cartridge) it will work with no problems. However, if you or your child outgrow the "package" and decide to become Hacker's there are some hardware differences. First the 2118 memory chips can't be piggybacked with older style 4116

chips to produce 32K. Don't do it even though it was a cheap upgrade on the old CoCo. Next, if you decide to connect any projects like modems, EPROM boards, etc. to the Cartridge Port you'll be surprised! It doesn't have the +12 and -12 volt pins connected anymore. No problem for commercial plug in's but remember this is a simplified machine so the extension edge connector has been stripped of the extra lines not really needed. Lastly but of most importance to a Computer experimenter (or interested Kid) is the fact that the Cartridge edge connector is directly connected to the 6809 CPU chip without buffering. So one slip up in connecting a home-brew project and the CPU is shot. Also never try to plug a Cartridge on or off with power turned on as a slight cross match of pins could destroy your computer.

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If you're looking for a fun machine or a starter for a Kid, then be sure to check all the "hidden" extras of competitors machines before you really have as complete and powerful a system as the COCO II. When you make an unbiased comparison I think you'll appreciate this Tandy "Little Giant".

TRS80 DISK MAGIC!

New Hyperzap 3.0

Hyperzap is more than just another disk copying program. It is the program for analyzing, copying, repairing, creating floppy disks of all kinds. It will copy any TRS80 format as well as disks from many others such as CP/M IBM-PC, CoCo, etc. specially designed to handle mixed density sectors on any track in any sequence. Many features for reading, writing, editing track and sector data. Hyperzap is the tool that lets you be in charge.

Make your own self booting disks. Take your own CMD file and turn it into a dual booting Mod I/III disk.

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Hardware needed: 48K 1 drive minimum. Mod 1 needs doubler. Mod 3 also works with double sided and 8". \$39.95 ppd.

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Transfer TRS-80 To IBM-PC

Michtron, Inc., a systems software house located in Southeastern Michigan, today announced that they have published a unique program "TRANSFER" that allows users of Radio Shacks Model

I/III and 4 computers to read and write to a disk that was formatted in MSDOS type format. This format is used by the IBM PC, TANDY 2000, Compaq, the Sanyo 550, and many

other computers.

Many owners of the Radio Shack Model I and III are buying the newer 16 bit computers and need a utility to help transfer their basic programs, word processor files, source code files, and data files over to their new computer. TRANSFER also allows owners of a Model I/III or 4 that have a IBM PC at the office, to work on programs at home.

Transfer has 5 commands from its main menu.

1. Read MSDOS DIRECTORY

This command prints on the CRT a MSDOS version 1 directory.

2. COPY MSDOS FILE TO TRSDOS

This will copy a file from a single sided MSDOS disk to any TRSDOS compatible formatted disk.

3. COPY TRSDOS FILE TO MSDOS

This will copy a file from any TRSDOS type formatted disk to a MSDOS disk.

4. SORT MSDOS DISK DIRECTORY

When you press #1 you

always get a sorted directory. (Filespecs sorted alphabetically). Many people have mentioned that they like the sorted directory. This option reads the directory into memory, sorts it and writes it back to the disk SORTED in seconds.

5. Format an MSDOS DISKETTE

You take a blank disk, insert it into a drive on your Model I/III or 4 and format it in an MSDOS format. This disk can then be read by the IBM PC, Tandy 2000, Compaq, etc.

TRANSFER also comes with a utility "CONV" that will add spaces around the keywords in basic programs that were written on the Model I/III so that they will run on Microsoft Basic.

TRANSFER'S FORMAT function is especially useful if you have a TANDY 2000 that only formats 80 track disks. You can use the format function, in TRANSFER, to format 40 track disks that your Model III can read and then the Tandy 2000 can convert these disks to the 80 track format. This also means that you can take some of your favorite word processing files or basic pro-

grams and send them to owners of an MSDOS computer.

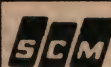
TRANSFER will copy any file from one disk format to another disk format, but in order for the other computer to read the copied programs they must be saved in ASCII. The reason for this is that different computer manufacturers use different tokens in saving basic programs in the compressed mode. Tokens for the IBM PC, Sanyo 550, and TRS 80 Model III are all different yet the same basic program will run on all three computers.

To use TRANSFER you need a Radio Shack Model I/III or 4 with 2 disk drives. With a Model I you will also need a doubler and at least one 40 track drive. TRANSFER comes on its own Multi Dos kernel for the Model I. On the Model III, it will operate under TRSDOS, NewDos, DosPlus or LDOS.

TRANSFER is the second in a series of programs designed to help owners of the Radio Shack line of computers exchange programs and data files with their friends, a second computer at work, or just with other friends who have a different kind of computer. CIII was the first program in this series. CIII allows the owner of a Model I/III or 4 to transfer programs to and from a Color Computer disk.

TRANSFER is available now on Disk for the Radio Shack Model I/III or 4 for \$59.95. From Michtron, 1691 Eason, Pontiac, MI 48054. Phone (313)673-1205.

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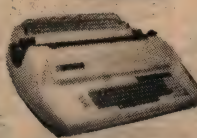
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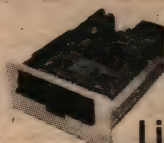
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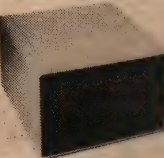
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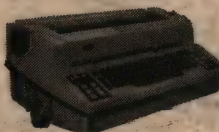
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Portable Computer Device Converses With Patient During 24 Hour Test

A portable electrocardiogram computer analysis device that can hold a conversation with the patient was unveiled at the American Heart Association Convention in Anaheim, CA in November by Florida based Medcomp Corporation. The result of this electronic dialogue with the

patient as he goes about his daily routine is a sophisticated, easily interpreted electrocardiogram that tells the doctor what was happening as characteristics of the patient's cardiac rhythm changed.

Called the EPICardia(tm) system, it consists of ultra-adhesive leads for attaching to the patient's body; Alpha(tm), a 15-ounce computer with electrocardiogram real time analysis that is a masterpiece of

miniaturization; Scribe(tm), an even lighter and smaller electronic device that asks questions both aloud and on a standard LCD display and then records them by a simple keyboard response; and Omega(tm), an office-based super microcomputer that processes, correlates and prints the completed analysis in report format.

The EPICardia is not the first portable cardiac analysis

system for 24-hour studies. It is, rather, the third generation of the application of a computer in replacing tape recorders, a relatively primitive method commonly used.

Setting it apart from its predecessors, other than its electronic diary are its simultaneous analysis of two channels, the quality of its analysis that comes from the two computers, and its accurate notation of occurrences that produced changes.

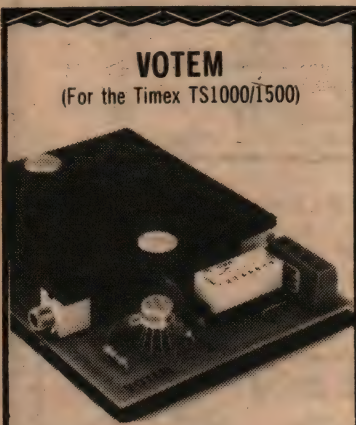
Until now, the patient assigned a 24-hour electrocardiogram was given a note pad and pencil. He might note that he drank a cup of coffee but not that he ran to catch the bus. The patient also had to take the initiative to make

diary entries instead of responding to activity or symptom related questions.

Ordinarily, the diary asks a set of questions, answerable by a "yes" or "no" every waking hour. "Sleep" and "nap" instructions deactivate the inquiring digital voice during sleeping periods. When the patient is experiencing symptoms, he can instruct the diary to question him and record the answers at that moment.

The questions can run the gamut from "Have you eaten anything?" or "Have you exercised?" to "Did you take medicine?" or "Did you experience trouble breathing?". The questions are both spoken

Continued on page 131



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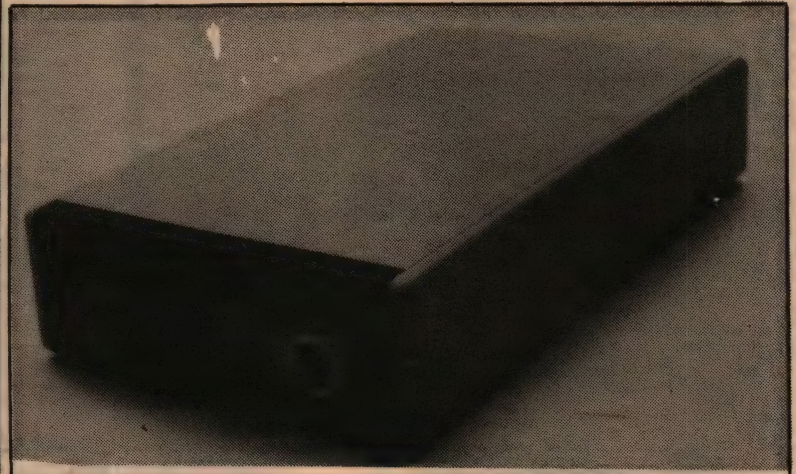
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Portable Computer Continued from page 130

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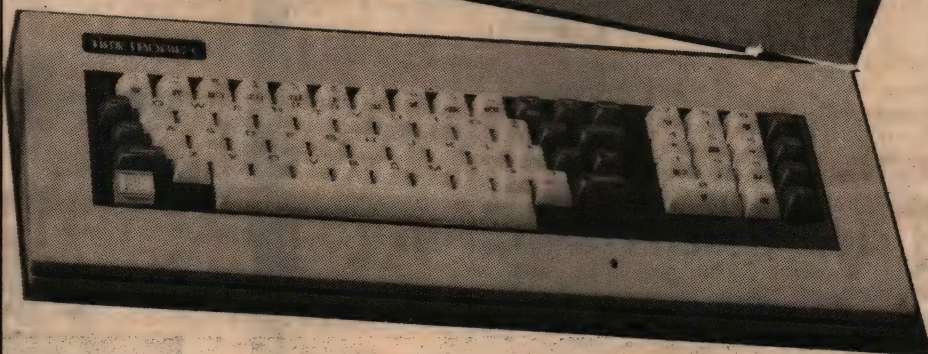


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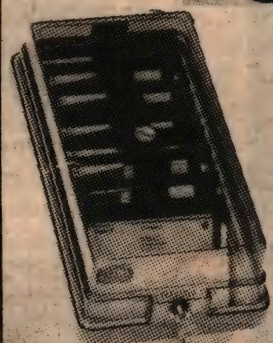
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Portable Computer Continued from page 131

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For more information contact Medicomp Corporation, 1250 West NASA Blvd., Melbourne, FL 32901.

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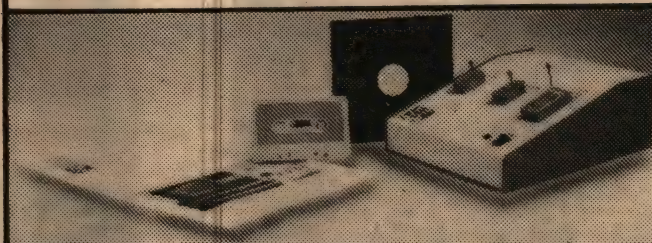
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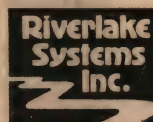
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Computer Applications In The Home: How To Use Your Computer As A 'Smart' Burglar Alarm

by Bill Dodd

Once the novelty of computer games wears off and your business programs have become routine, you may desire to find an even more practical use for your computer. Computers can be and have been applied to fully automate the house. Everything from starting the coffee to turning on the garage lights has been computerized. (There are several books out now on the subject.)

This article tells how to use a VIC-20 to monitor a household burglar alarm and not only alarm (silent or loud), but also give a readout of entry time and location. This information in turn helps when trying to identify the burglar.

We will use the VIC-20 since it is a popular computer and has a built-in parallel port. Dwg. #1 shows the location of the parallel user port.

The circuit used is a simple 8 bit parallel port, using seven inputs and one output. Six of the inputs are for doors, windows, etc., and can be connected either to an existing alarm system or alarms (ultrasonic, etc.) or to entry limit switches or tapes on windows. The seventh input is a key entry to prevent an alarm. The output is a relay driver contact to power a horn, siren, silent alarm (re: to a monitor station) etc.

Dwg. #2 shows the circuit to be added to the standard 12/24 pin parallel expander port. We are using the VIC-20's pin numbers (not industry standard) so use the drawing as a guide.

The circuit shown uses a minimum of components. DIP type relays were used for the input since we had extras on hand. Opto isolators would work just as well. Isolation is a must via relay or opto isolator in order to keep static or (accidental) building voltages out of the computer.

Construction

Build the circuit on a perf board that will allow you to solder on a 12/24 pin .156" connector. Solder in the relays and wire per the schematic.

Rather than get into a long

discussion of alarm signaling devices (switches) available and their characteristics, please refer to the fine selection of devices at Radio Shack or as supplied by local alarm companies and electric suppliers. For our example application, we will assume that magnet operated reed switches are being applied at four sets of windows and two doors in a small apartment.

Field Wiring

You will need contact closures from the doors/windows that you are going to monitor. Since we have six inputs from alarm points there may not be enough inputs for a large house or apartment. If this is the case, use the group wiring method shown for monitoring groups of windows. This will allow monitoring the general area. You may

connect the output of an ultrasonic or photo detector of a fire alarm if you desire. You will need a contact closure from these items. You can use either normally open or normally closed contacts (and change software accordingly); however we suggest using normally closed contacts (contacts closed when door/window is secure).

To wire the switches, use at least a #22 gauge wire and route wire as suggested by the device wiring instructions. Conceal wires behind facing boards, etc.

The seven signal wires plus a +5VDC feed all switches (groups) in turn, and the signal wire is attached on each switch on the other terminal. Two additional wires feed the alarm or surveillance device.

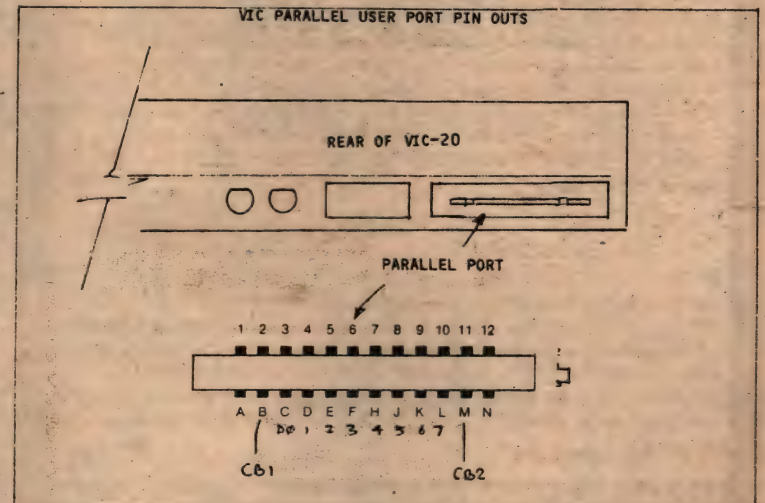
Once the system is wired, test the relay board without its

being connected to the computer. Once testing is completed, plug the board in, load the program, and try the

system. Turn the key switch to

Continued on page 134

DWG #1



```

4522 IF C0>32 THEN PRINT "#6 FRONT DOOR"
4528 IF C0=32 THEN RETURN
4530 C1=C0-32
4540 IF C1<0 THEN C1=C0
4545 IF C1>=16 THEN PRINT "#5 LR WINDOW"
4548 IF C1=16 THEN RETURN
4550 C2=C1-16
4560 IF C2<0 THEN C2=C1
4565 IF C2>=8 THEN PRINT "#4 MASTER BR"
4568 IF C2=8 THEN RETURN
4570 C3=C2-8
4580 IF C3<0 THEN C3=C2
4585 IF C3>=4 THEN PRINT "#3 BACK BR"
4588 IF C3=4 THEN RETURN
4590 C4=C3-4
4600 IF C4<0 THEN C4=C3
4605 IF C4>=2 THEN PRINT "#2 BACK DOOR"
4608 IF C4=2 THEN RETURN
4610 C5=C4-2
4620 IF C5<0 THEN C5=C4
4625 IF C5>=1 THEN PRINT "#1 KITCHEN"
4628 IF C5=1 THEN RETURN
4630 C6=C5-1
4640 IF C6<0 THEN PRINT "#1 KITCHEN"
4645 IF C6=0 THEN PRINT "EXIT"
4650 IF C6=0 THEN RETURN
4999 RETURN
5000 FOR S=1 TO 100: NEXT S
6000 REM ALARM ROUTINE
6100 IF C>64 THEN GO TO 7000
6200 OF ALR$="S" THEN RETURN
6300 IF ALR$="A" THEN GO TO 6400
6400 REM SET ALARM
6410 POKE 37136,128
6500 REM ALARM WE WILL GENERATE SOUND ON VIDEO TO SIMULATE HORN
6600 POKE 36878,3
6700 POKE 36875,225
6800 FOR N = 1 TO 200: NEXT N
6900 POKE 36875,0
7000 PRINT "PLEASE RESET ALARM BEFORE ACTIVATION!!!"
7500 F=0
7550 FOR I=1 TO 1000
7600 GET AS: IF AS="" THEN GO TO 7700
7650 IF AS="R" THEN GO TO 8000
7700 NEXT I
7770 GO TO 6500
7800 RETURN
8000 PRINT "ALARM OFF"
8050 POKE 37136,0
8100 REM REPORT GENERATION
8200 FOR R=1 TO S
8250 PRINT "TIME", "SWITCHES"
8300 PRINT NTR$(R),C(R)
8400 NEXT R
  
```

```

10 S=0
20 DIM NTR$(100)
30 DIM C(100)
100 REM *** SECURITY ALARM SYSTEM ***
200 REM *** BY BILL DODD ***
300 REM SET UP
400 REM INITIALIZE COMPUTER DATA DIR REG
500 REM SET FIRST 7 BITS TO INPUT AND 8TH BIT TO OUTPUT
600 POKE 37138,128
700 REM INSURE ALARM IS TURNED OFF
800 POKE 37136,0
900 REM SET ADDRESS VARIABLES
1000 A=37138
1100 B=37136
1200 REM GO TO SET UP

2000 REM SET UP
2050 PRINT "clr home"
2100 PRINT "INPUT TIME, HOURS MINUTES SECONDS, EX. 10:35AM = 103500"
2120 IF VAL(TIS)>235959 THEN GOTO 2100
2125 TIMES = TIS
2200 PRINT "ALARM SILENT OR ALARM, S OR A"
2210 INPUT ALR$
2220 IF ALR$ = "S" THEN LRMS = "SILENT MODE"
2230 IF ALR$ = "A" THEN LRMS = "ALARM MODE"
2280 PRINT "clr home"
2285 REM
2290 PRINT "START UP TIME IS", TIS
2300 PRINT "ALARM IS", LRMS
2400 REM TIME TO SET ALARM:
2450 PRINT "PLEASE SET ALARM, NOW COUNTING DOWN 60 SECONDS"
2500 FOR I = 1 TO 50000: NEXT I
2999 PRINT "ALARM ACTIVATED"
3000 REM MONITORING ROUTINE
3100 REM INPUT ROUTINE
3150 CK = C
3160 GET RS
3170 IF RS = "R" THEN GO TO 8000
3190 REM AND 127 MASKS OFF THE 8TH (OUTPUT) BIT SO IT ISN'T READ
3200 C = PEEK (37136) AND 127
3400 IF C < > CK THEN GOSUB 4000: IF C = 0 THEN PRINT "CLOSE"
3500 FOR I = 1 TO 600: NEXT I
3600 GO TO 3150
4000 REM ENTRY POINT CALCULATION
4100 S = S+1
4300 NTR$(S) = TIS
4350 C(S) = S
4400 PRINT "TIME ACTIVITY", TIS
4450 GOSUB 6000
4500 REM LOCATION CALCULATION
4510 IF C>=64 THEN PRINT "#7 KEY LOCK OPENED"
4515 IF C=64 THEN RETURN
4518 C0=C-64
4520 IF C0<0 THEN C0=C
  
```


Burglar Alarm

Continued from page 133

"activate" or closed position and then manually test each door and window.

Program Operation

The program repetitively monitors the seven input switches (once per second). If an

entry (fire, alarm, etc.) is detected, then the computer logs the entry point and time, and displays same on the screen. Once displayed, the computer closes the relay (D7) which activates the device of your choice (sirens, horn, camera, video recorder, silent alarm, etc.). (System shows time on a 24 hour basis).

To operate, type RUN, enter

TIME (100000 for 10:100 am) and then whether SILENT or AUDIO ALARM. (Note that the output relay, #8, drives on regardless.) The audio alarm is simulated on the monitor. You have 60 seconds to set the key switch after setting the alarm, and about 15 seconds to hit 'R'

to reset the system and prevent false alarm.

If a burglar comes in through the back window and stays a while in the process of his robbery, and later leaves by the front door, you will have this information logged in the computer. When you come

home, and after your computer display verifies the bad news, you can get a readout of when and what sequence the robbery took place, simply by pressing 'R'. With the help of (hopefully) observant neighbors, you may be able to discover who (or what vehicle) was in the vicinity during the time of the burglary.

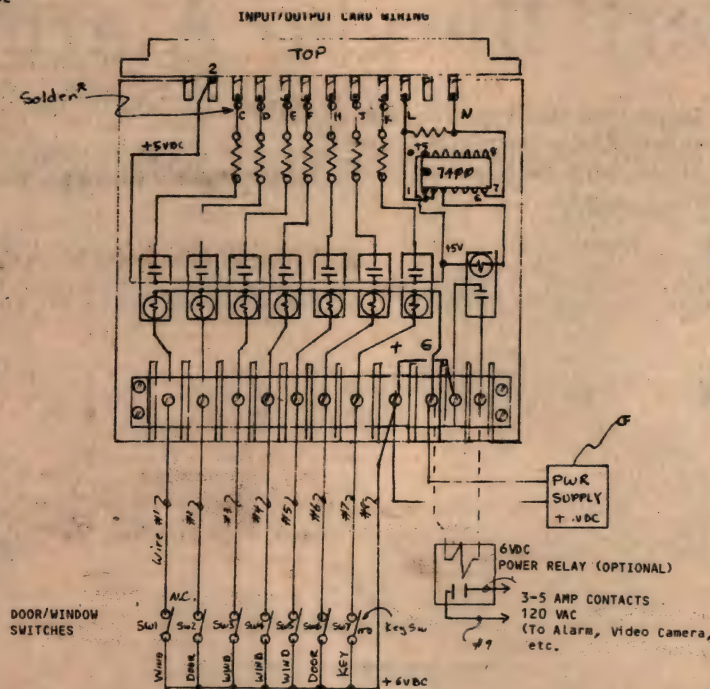
Note that if you have a modem and auto-call capability with a votrax or voice output connected to the phone, you could have the computer call you at work to deliver a message. (We'll leave that task and program to the ambitious hacker with more time on his hands.)

If you have a video camera and recorder triggered by the break-in, you will have an excellent chance of identifying the robber!

You have an opportunity to select alarm only (of fire or other detected event - water in the basement or freezer lost power, etc.) in cases where you want selected alarms.

The circuit and program are very elementary, but give an adequate amount of protection. You could expand on the program with flashing screen, banner display, and even printed reports. However, be sure if you are going to depend on it to leave the program running and provide the computer with adequate power backup (in case power is lost).

DWG #2



PARTS LIST:

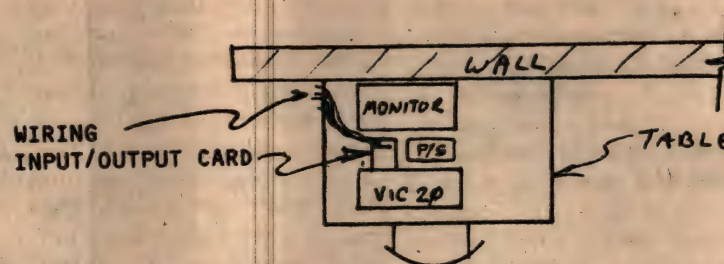
1. 8 EA. RELAYS: CLARE: PRIMA 1A05 Or equivalent, (5VDC Coil.)
2. 7400 Integrated Ckt. Quad Dual Nand Gate.
3. 7 EA. 500 Ohm Resistors.
4. 1 EA. 12/24 Pin (.156" Centers) dual edge pc connector.
5. 1 EA. min 11 Pin screw terminal connector.
6. 1 EA. Minimum 3" x 4" Perf board.

NOTES:

- *1. SOLDER RESISTOR LEADS TO BOTTOM CONNECTOR (PINS C-K & N)
- *2. REFER TO RELAY BEING USED FOR PINOUTS.
- *3. USE OUTPUT CONTACTS OF ALARM RELAY TO DRIVE POWER RELAY IF ALARM OR SIGNALING DEVICE IS OVER 100 MA.

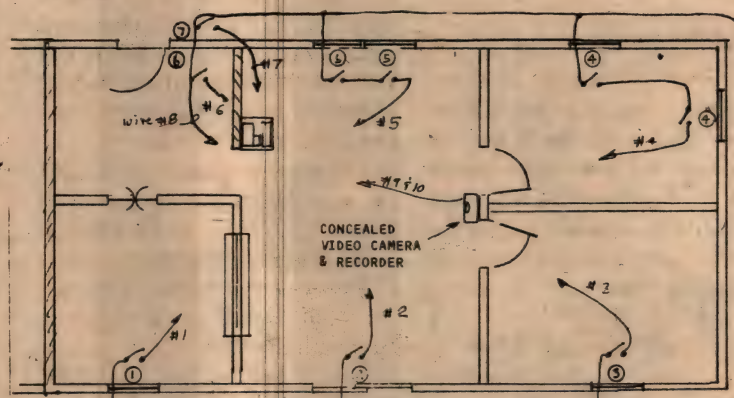
DWG #3

PLAN VIEW OF COMPUTER SET UP



DWG #4

PLAN VIEW OF SWITCH WIRING TO WINDOWS AND DOORS



WIRING SHOWN ON OUTSIDE FOR CLARITY OF CIRCUIT.
ACTUAL WIRING ASSUMED TO BE CONCEALED ON INSIDE OF BUILDING!

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- * Surge protection is needed, and high power spike protection is also needed.
- * Special filters are needed to eliminate line noise.

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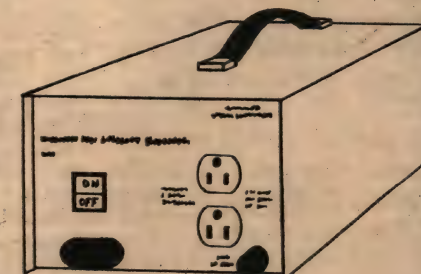
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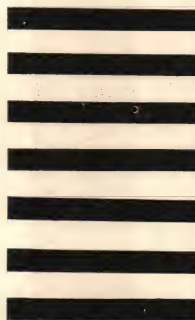
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ROBOTICS

IBM Announces New Low-Cost Robotic System

IBM Corporation has announced a highly versatile, low-cost addition to its robotic systems products—the IBM 7545 Manufacturing System.

The IBM 7545 is a programmable, electric-drive manufacturing system designed for a wide range of electro-mechanical assembly, fabrication and material-handling tasks. The new system complements IBM's lowest-priced robotic system, the IBM 7535, adding a continuously variable vertical axis, a longer vertical range and a more powerful roll motor.

The IBM 7545 features four servo-controlled axes capable of moving the robotic arm in four directions with a payload of nearly 22 pounds (10 kg).

The servo-controlled vertical axis enables the tooling to be stopped at any point along its 9.8-inch (250 mm) vertical range and makes it a highly flexible manufacturing tool. The new, servo-controlled roll motor produces five times more torque than the IBM 7535 roll motor.

The system is controlled by a microprocessor-based unit that can store up to five distinct, multiple-point routines or programs to a maximum of 24,000 bytes of memory. The different programs can be selected through a manual operator panel, enabling users to perform a variety of production operations and to change them quickly and easily.

Enhanced Programming Language

Application programs for the IBM 7545 are developed on an IBM Personal Computer, using an enhanced version of IBM's new entry-level robotic programming language,

AML/Entry Version 3. The language enables manufacturers in a wide range of industries to easily and quickly create application programs uniquely suited to their pro-

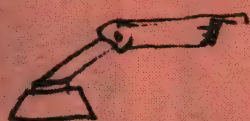
duction requirements.

The Personal Computer also is used to send programs to the controller and is capable of programming multiple robotic systems. When not occupied

with this task, it is available to perform other business functions independent of the robotic system, such as accounting, inventory control, general payroll and financial analysis.

IBM's new robotic system provides users with advanced

Continued on page 136



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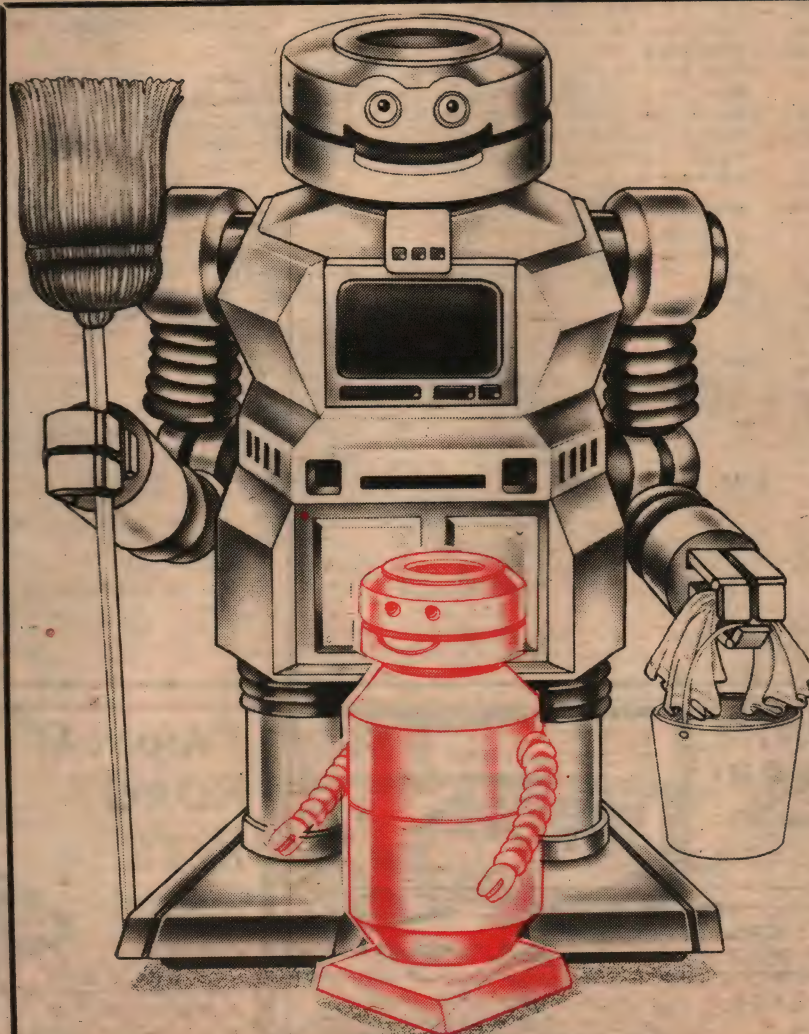
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IBM Announces Continued from page 135

functions such as data communications, programmable speed, linear interpolation and high-level palletizing support.

This last feature allows users to create palletizing applications without having to teach the system all the locations in a pallet. Given specified boundary coordinates and the total number of points, the system can locate the rest, reducing programming time and minimizing the amount of

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System highlights:

- * One horizontal arc for each of the two arm segments with a sweep of 200 and 135 degrees (± 1.0 degrees) respectively, for motion in the X and Y axes.
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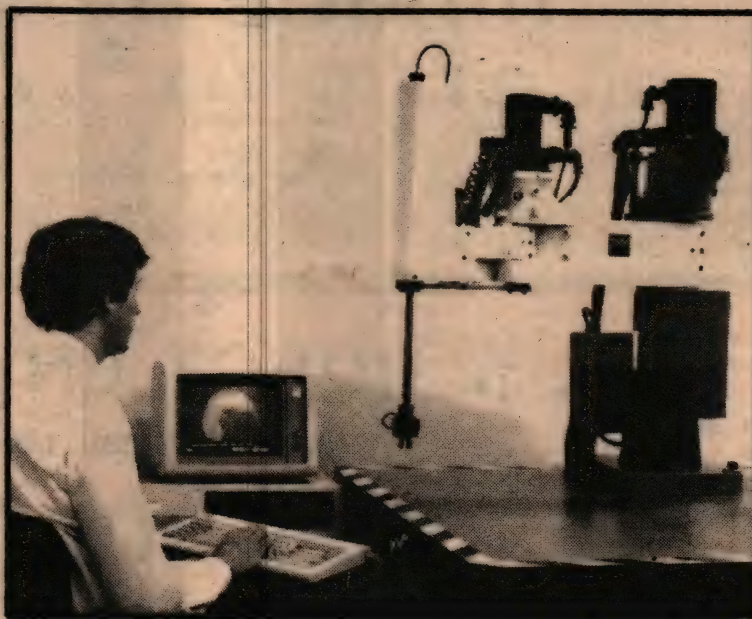
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 - * Repeatable to ± 0.05 mm (± 0.002 inches)
- Programs are developed and loaded into the control unit

using an IBM Personal Computer. The control unit can store up to five different multiple-point routines or programs, to a maximum of 24,000 bytes of memory. The programs are selectable through the operator panel. This permits users to program the IBM 7545 to perform a variety of production opera-



tions and to change operations quickly and easily.

Multiple robotic systems can be programmed with a single IBM Personal Computer. The IBM 7545 responds to a version of the AML robotics language developed by IBM called AML/Entry Version 3. Features of the programming language are:

- * Easy-to use, menu-driven system
- * Editor to create and edit programs quickly and easily and save programs on diskette
- * Teach mode that has graphic display of workspace and digital output control to locate application tooling
- * English commands, including a command for straight-line moves
- * Movement to absolute positions or to incremental values
- * Expression of points in Cartesian coordinates
- * A high-level palletizing aid
- * Programmable speed
- * Data communications capabilities allow the system to communicate with other devices, such as a plant host computer (RS232 or RS422 interface)
- * A command to query a host for particular values of a variable to be used in a program
- * Compiler provides extensive error-detection and message system

The IBM 7545 joins IBM's current line of robotics products, which includes the IBM 7535, IBM 7540 and IBM 7565 manufacturing systems.

AML/Entry Version 3 is priced at \$3,000. IBM Personal Computer configurations to program robotic systems are available through IBM Product Centers and authorized dealers.

Deliveries of the IBM 7545 are expected to begin in the first quarter of 1984. The system can be purchased for \$36,000 through IBM Advanced Manufacturing Systems, Boca Raton, Florida.

Coming Events

If you know of or have a trade show, swap meet or club meeting connected with the computer field, we'll run an announcement in the COMING-UP section FREE of charge.

MARCH 9-11, 1984

Orlando Hamcation and Computer Show, sponsored by the Orlando Amateur Radio Club, held at the Expo Centre, Orlando, FL. For more information, write the Orlando Hamcation, P.O. Box 15142, Orlando, FL 32858.

MARCH 12-15, 1984

Interface '84, held at Las Vegas Convention Center. For more information contact, Interface '84, 300 First Avenue, Neeham, MA 02194 or call (617) 449-6600.

MARCH 13-15, 1984

ATUG '84, staged at the Regent Hotel, Collins Street, Melbourne, Further details can be obtained from Mr. Gary Fahey at Control Data on 221 4011. For further information relating to exhibition, contact Riddell Exhibition Promotions Pty. Ltd., 137-141 Burnley St., Richmond, 3121, phone (03) 429-6088.

MARCH 16-17, 1984

1984 Charlotte Hamfest and Computerfair, held at the Charlotte Civic Center. For more information, call Clyde Weddle at 704-596-2168.

MARCH 22-25, 1984

West Coast Computer Faire, held at San Francisco Civic Center. For additional information on FIG and Faire activities call the FIG HOT LINE (415) 962-8653 or write P.O. Box 1105, San Carlos, CA 94070.

MARCH 25, 1984

1984 Greater Baltimore Hambores and Computerfest, Maryland State Fairgrounds Exhibit Complex at

Timonium, MD. For more information contact GBH & Co., P.O. Box 95, Timonium, MD 21093 or call (301) 561-1282.

MARCH 26-27, 1984

Videotex - Teletext, New York City, The new North American Standard NAPLPS. For more information phone (201) 661-2300.

MARCH 27-29, 1984

Business Expo. Market Hall, Dallas, TX. Exhibiting or visiting information for the Southern California Business Expo or other shows across the country may be obtained by calling 1-800-222-EXPO.

MARCH 27-29, 1984

The Seventh Annual Southwest Computer Conference, held at the Myriad Convention Center in Oklahoma City. For more information, contact E.Z. Million, SWCC, P.O. Box 950, Norman, OK 73070.

MARCH 29-30, 1984

Videotex - Teletext, Ft. Lauderdale, FL. The new North American Standard NAPLPS. For more information phone (201) 661-2300.

MARCH 30 - APRIL 1, 1984

NY Personal Computer Show, held at the Madison Square Garden. For more information, contact Kengore Corp., 201-297-2526.

APRIL 1-5, 1984

COMMON - Spring 84 Conference, held in Cincinnati, Ohio. For more information contact David G. Lister, Administrative Director, COMMON, 435 N. Michigan Ave., Suite 1717, Chicago, IL 60611 or call (312) 644-0828.

APRIL 12-14, 1984

Great Southern Computer Show, held in Jacksonville, FL. For more information, call 904-353-0418.

APRIL 13-15, 1984

International Personal Robot Congress & Exposition 1984, Albuquerque Convention Center, Albuquerque, New Mexico, USA. For more info write IPRC, 1547 South Owens St., #46, Lakewood, CO 80226.

APRIL 14-15, 1984

ACSA Annual Conference, held at the Moscone Center, San Francisco, CA.

APRIL 15, 1984

Maryland Computer Swap Meet, held at Silver Spring Armory, Wayne & Fenton St., Silver Spring, MD. For more details write, Capitol Computer Group, 308 Main St., Box 5210, Laurel, MD 20707 or call (301) 498-0121.

APRIL 18-20, 1984

Business Expo. For more information on shows across the country, call 1-800-222-EXPO.

APRIL 26-28, 1984

Great Southern Computer & Electronics Show, held at Carolina Coliseum, Columbia, SC. For more information contact Great Southern Computer Shows, P.O. Box 655, Jacksonville, FL 32201, or (904) 356-1044.

APRIL 26-29, 1984

3rd Annual New York Computer Show held at Nassau Coliseum in Uniondale, Long Island. For more information contact Northeast Expositions, 822 Boylston St., Chestnut Hill, MA 02167 or call (617) 739-2000.

MAY 1-4, 1984

St. Petersburg Computer Show, held at Bay Front Center, Southeastern Productions, Inc., 7819 N. Dale Mabry, Suite 206, Tampa, FL 33614.

MAY 3-6, 1984

The Personal Computer Userfest, O'Hare Exposition Center in Chicago, IL. For more information contact Northeast Expositions, 822 Boylston St., Chestnut Hill, MA 02167 or call (617) 739-2000.

MAY 5, 1984

Northwest Computer Swap, Oakland Convention Center, Oakland, CA (408) 266-6768.

MAY 7-11, 1984

Tutorials For Professional Development, held at Chicago Marriott O'Hara, Chicago, IL. A complete program announcement giving registration and hotel information will be available in the fall from the IEEE Computer Society, P.O. Box 639, Silver Springs, MD 20901 or call (301) 589-8142. TELEX: 7108250437 IEEE COMPSO.

MAY 10-12, 1984

Southwest 1984, held at the Regency Hotel and Conference Center, Denver, CO. For more information call (303) 499-1034.

MAY 19-20, 1984

Boston Area Microcomputer Show and Flea Market, Northeast Trade Center, Woburn, MA. For additional information contact Ken Gordon Productions, PO Box 13, Franklin Park, NJ 08823 or call (201) 297-2526.

MAY 26-27, 1984

TPUG Conference held at the Constellation Hotel, 900 Dixon Road, (adjacent to airport), Toronto, Ontario. For further information contact Chris Bennett, TPUG Business Office, 1912A Ave. Road, Toronto, Ontario M5M 4A1 or phone (416) 782-9252.

JUNE 2, 1984

Amateur Fair, Minnesota State Fairgrounds, located on Snelling Ave., North of I-94. For additional information contact Amateur Fair, PO Box 857, Hopkins, MN 55343 or call (612) 420-6000.

JUNE 2-3, 1984

NJ-NY-CT Microcomputer Show & Fleamarket, Meadowlands Hilton Hotel, Secaucus, NJ. For more information contact Ken Gordon Productions, PO Box 13, Franklin Park, NJ 08823 or call (201) 297-2526.

JUNE 21-23, 1984

Veterans Memorial Coliseum, Jacksonville, FL. For more information contact Great Southern Computer Show, Box 655, Jacksonville, FL 32201 or call (904) 356-1044.

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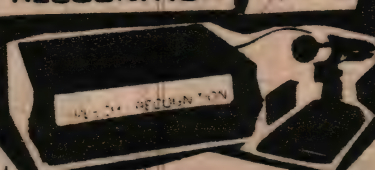
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Feedback And Control Inputs To Computer And Adjustment Of Program

by Bill Dodd

A robot cannot operate autonomously for very long without the use of sensory detection and feedback. Without sensory capability, the robot must depend on human (or external) detection and control. In this article, we will look at several simple detectors with applications on a personal robot.

The Bulldog robot is a very low cost personal robot for the enthusiast who wants to start with simple yet expandable design. To date in these Computer Shopper articles, we have built the robot's structure, mobile base, manipulators, and power supply (previous articles).

The Bulldog has been operated from both pendent control as well as computer control. We have concentrated on VIC20 application though TS1000 has been demon-

strated.

Robot Sensory Application Types Of Sensors

A personal robot can be equipped with many types of sensors. These can be very simple limit switches, very sophisticated pattern recognition units, or many intermediate types. The more capable of discernment a sensor, the better the decision making capability of the robot - or the faster it can make the proper move. For example, a limit switch can detect an object - perhaps signaling the computer's program to back up, turn, and proceed (blindly). An acoustical input on the other hand may be used to detect the size of the obstacle and direct a smaller detour. The problem is of course that the higher the sensor's capability, the more it will cost and (possibly) the greater the added weight, power consump-

tion, and processing time required to operate it.

Since we are budgeting a very low cost robot, we will not apply the more sophisticated sensory ap-

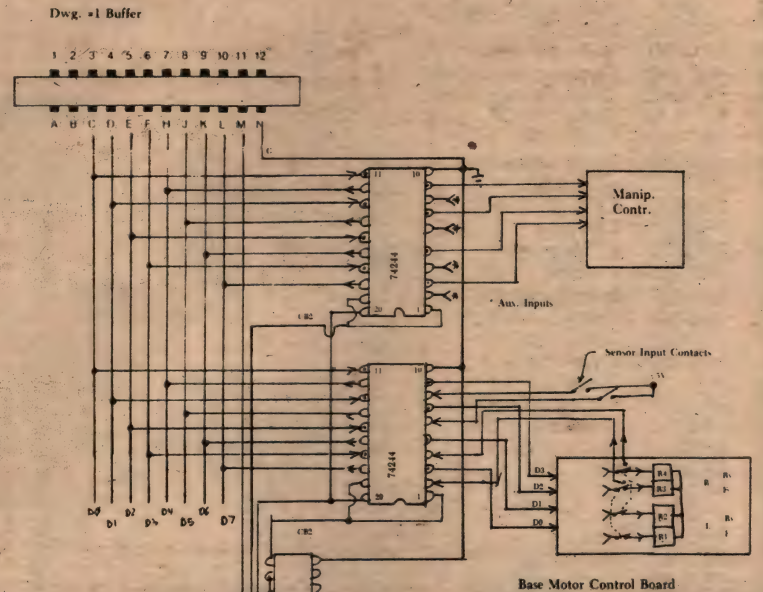
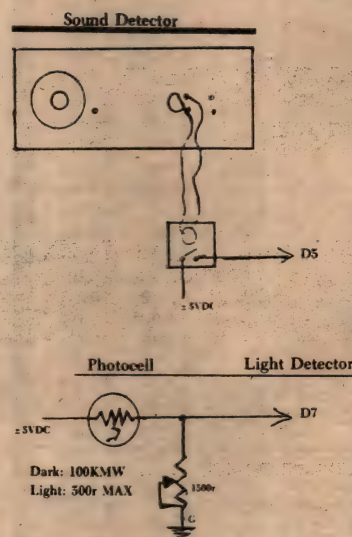
proaches but will apply (to the Bulldog) the simpler ones.

Analogous to the human senses, the Robot's sensory possibilities lie in the physical

'touch', 'visual', electrical EMF areas, and some acoustical

Continued on page 138

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739	1.55	3053	.95	3098	1.05	3193	1.65	MC1489	.62
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Feedback & Control Continued from page 137

areas. There is indeed a wide range of choices.

In fact, there is almost an unlimited choice in sensor types and applications. Many off the shelf devices can be applied directly, and others can be modified or combined for new applications. Though physical touch is limited to manipulating feelers onto or around contours, the optical, IR, EMF, and acoustical approaches offer wide variety of applications. The following is but a partial list of sensors, starting with the simpler and proceeding to the more complex types. Some of these are applicable in many tasks (i.e. limit switches) where others are limited to special cases (i.e. contour detection).

Physical (requires physical contact)

1. Limit switches (i.e. obstacle detection).
2. Pneumatic (pressure) switches (obstacle detection).
3. Contour 'feeler' detection (object recognition).
4. Load (amperage) detection (motor load increase on meeting obstacle).
5. Wire following or track following sensors.

Acoustical

```

100 REM ROBOT I/O ROUTINE #1
200 REM SET DATA DIRECTION REGISTER
210 REM D0-D3 OUTPUT, D4-D7 INPUT
220 POKE 37138, 15
230 REM PROCEED TO FIRST OUTPUT COMMAND
235 PRINT "INPUT DIRECTION F,B,R,L
240 GET A$: IFA$ = "GOTO 240
250 IF A$ = "Q" THEN END
260 IF A$ = "F" THEN D = 5
270 IF A$ = "B" THEN D = 10
280 IF A$ = "R" THEN D = 6
290 IF A$ = "L" THEN D = 9
300 REM OUTPUT ROUTINE
310 LET OUT = 37136
320 POKE OUT, D
330 REM OUTPUT LATCH NOW SET, NOW READ INPUTS
340 LET IN = 37136
345 REM MASK OUTPUT BITS FROM BEING READ
346 REM TIMING LOOP
347 FOR I = 1 TO 100
349 REM READ BITS D4 AND D5 ONLY
350 Y = PEEK (IN) AND 48
370 REM JUMP TO DECISION ROUTINE
380 GOTO 1000
400 REM TIMING LOOP
405 IF I = 100 GOTO 500
410 NEXT I
500 REM TURN OFF MOTORS
510 POKE OUT, 0
600 GOTO 240
1000 REM DECIDE ON COURSE OF ACTION
1010 PRINT Y
1020 IF Y = 0 THEN GOTO 400
1025 REM IF Y > 0 THEN OBSTACLE DETECTED
1050 GOSUB 2000
1070 IF Y = 16 THEN POKE OUT, 9: PRINT "FRNT": GOTO 400
1080 IF Y = 32 THEN POKE OUT, 5: PRINT "REAR": GOTO 400
1090 GOTO 400
2000 REM STOP MOTORS
2010 POKE OUT, 0
2015 REM REMOVE RETURN IF FULL STOP DESIRED
2020 RETURN
2030 PRINT "OBSTACLE DETECTED, HAVE STOPPED"
READY.

```

1. Sound detection (start-stop on sound intensity or detection).
2. Frequency detection (code encoding/decoding applications).
3. Ultrasonic range detection (obstacle detection).
4. Ultrasonic motion detection (doppler applications or movement detection).
5. Sonic range finding (fog horn type).

Optical

1. Photocell detection, optical & infrared (obstacle & distance detection).
2. Photocell information reception (frequency - beacon orientation detection).
3. Photocell and floor optical or chemical tracking.
4. Light detection (sunlight & room light detectors).
5. Photocell optical encoding (position/distance sensing).

Video Type

1. Two dimensional scanning.
2. Video processing and pattern recognition.

Miscellaneous

1. Radar (high radio frequency detection and/or

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Feedback & Control

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- scanning).
2. Microwave.
3. X-Ray Detection.
4. Magnetic.
5. Current Sensing.
6. Static Electric Field Sensing.

f1} There are many other possible sensors that may be applied to personal robots, including fire/smoke, heat, temperature, vibration detection, etc.

For our low cost purposes, we will limit ourselves to elementary physical, acoustical, and optical detectors. Much can be done with these devices with proper computer programming.

Bulldog Sensors:

For the Bulldog, we will install simple obstacle detection on the front and rear of the unit. The obstacle detectors will send a signal back to the computer and simultaneously stop the Bulldog from proceeding in the original direction. In addition, we will add an acoustical detector and a light sensor. These devices are already available at electronic stores in most areas.

Installing Sensors:

As important to the sensor itself is the installation of the sensor. If a limit switch is improperly installed, it can become broken, or it will register incorrectly. The same potential problem holds for optical sensors. The environment must always be considered. Things like dust, humidity, mounting height, and many other considerations should be made.

Limit Switch Installation:

We are using two simple DPDT limit switches on our robot to detect bumping into obstacles. These are mounted on the base of the robot (See Dwg. #2) and use simple feeler wires to detect obstacles. The flexible wires are light weight and bend upon impact so that the switch is not damaged. The limit switches are mounted just to one side of the casters on the base. The feeler wires are soldered onto the switch bars in such a way to parallel the front and rear sides. Wiring of the switches is very simple. Two normally closed contacts are wired in series with the relay coils of the control board. The normally open side of either pole is connected to the inputs D4 and D5 on the first buffer. If you only have SPDT switches, simply put the NC in series with the return wires of

the pair of relays for forward and the NC of the second limit switch in series with the return wires of the pair of relays for reverse.

Sound Sensor:

To install the Sound sensor, first locate a simple sonic switch, usually available in a Radio Shack or electronics store. These units, which use a small earphone for a sound pickup, are normally available for under \$5.00. Some of these operates a TRIAC or SCR for driving 120VAC devices, so you may have to pick your controlling voltage from in front of the output device. Experimenting with a volt meter, find a strong switching voltage that tracks the sound. This voltage can be used to drive a relay to input the 5VDC signal into the input port.

Light Sensor:

The light sensor is easier yet. You can provide a light sensor by installing an adjustable potentiometer and a photoresistor (photoresistor) in series as shown in Dwg. #3. The photoresistor should have a resistance of under 500 ohms in a lighted room or whatever light conditions you want detected. The adjustable potentiometer will give you a good range of detection. When the resistance is down in the photoresistor (less than 1000 ohms) due to the light levels increasing, you will get a sufficient voltage to the computer input port.

Both the sound detector as well as the photoresistor can be

mounted easily on the inside of the robot. The photocell must be able to pick up light directly, so if you have a dark or translucent covering, be sure to drill a hole so that the photocell can 'see' light! The sound sensor may also need a hole or holes to allow sound to activate its circuit. Both of these units can be powered from 6 VDC provided by the motor control batteries.

Since we are working with all 8 bits of the computer interface, we need a way to input the data without losing control of the base motors and arm. To do this, we will add a very simple (but important) I.C. chip to our design - a 'TRI-STATE' latch.

We would like to be able to detect an obstacle while moving. This is easy to do with computers which have a PIA, PIO, or VIA. We will use the VIC in order to demonstrate how this can be done.

We are limited to 8 bits of combined input and output at a time. Since our driver board does not latch, we will have to keep the outputs in the PIA active in order to keep the Robot moving. If we dedicate 4 Data lines to the output and 4 to input, we will not be able to operate the arm motors simultaneously. We could use gating and advanced multiplexing methods, but in order to keep the design simple and inexpensive to build, let's see how we can share the 8 bit bus for more than 8 operations. By using the tri-state buffers between the computer's data lines

and two sets of I/O busses, we have created a very simple multiplexer.

Dwg. #1 shows the two tri-state buffers. The first tri-state normally connects the computer bus to four output lines

(needed to drive the base motors) and to four input lines (from detector). When the arm

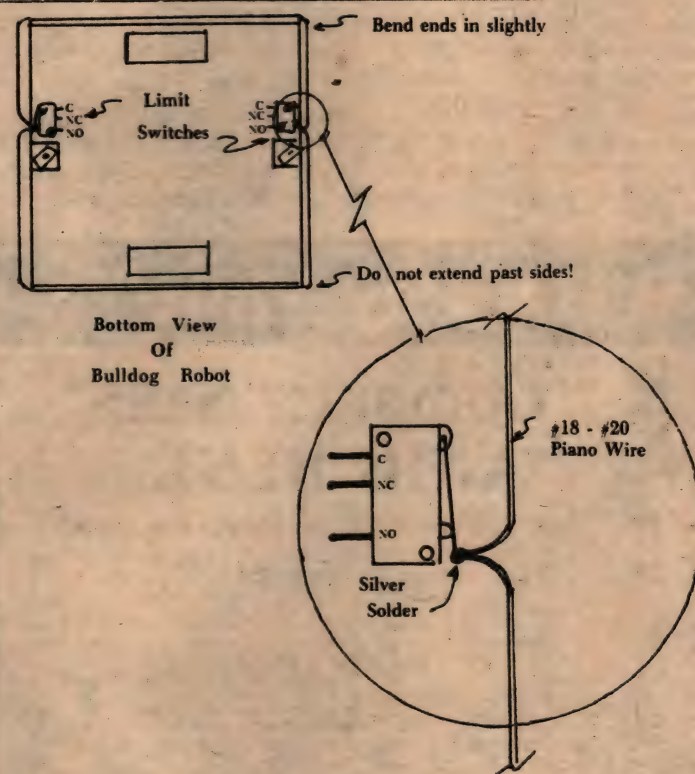
Continued on page 140

```

2020 RETURN
2030 PRINT "OBSTACLE DETECTED, HAVE STOPPED"
5000 REM OUTPUT FOR ARM
5110 REM SET ACR
5120 POKE37147, PEEK(37147) AND 227
5125 REM SET CB2 HIGH
5130 POKE37148, PEEK(37148) OR 224
5150 REM RETURN TO OUTPUT MODE
5160 GOTO320
5500 REM OUTPUT RESET FOR BASE
5510 REM SET ACR
5520 POKE37147, PEEK(37147) AND 227
5525 REM SET CB2 LOW
5530 POKE37148, (PEEK(37148) AND 31) OR 192
5540 REM RETURN TO OUTPUT MODE
5550 GOTO320
READY.

```

Dwg. #2 Limit Switch Installation



```

10 REM ROBOT I/O ROUTINE #2
15 REM USING CB2 STROBE TO OPERATE BUFFERS
20 REM CB2 TEST ROUTINE- MOD '90 GOTO20' FOR CB2 TEST
30 REM LINES 40-100 FOR TEST, CAN BE ELIMINATED FOR NORMAL OPERATION OF POKE
35 REM SET ACR
40 POKE37147, PEEK(37147) AND 227
45 REM SET CB2 POSITIVE
50 POKE37148, PEEK(37148) OR 224
60 FOR I = 1 TO 100:NEXT
65 REM SET CB2 NEGATIVE
70 POKE37148, (PEEK(37148) AND 31) OR 192
80 FOR I = 1 TO 100:NEXT
90 REM GOTO 20
200 REM SET DATA DIRECTION REGISTER
210 REM D0-D3 OUTPUT, D4-D7 INPUT
220 POKE37138, 15
230 REM PROCEED TO FIRST OUTPUT COMMAND
235 PRINT "INPUT DIRECTION F,B,R,L"
240 GET A$:IF A$=" "GOTO240
250 IF A$="Q" THEN END
255 IF A$="U" THEN D=1:X=1
260 IF A$="F" THEN D=5:X=0
265 IF A$="D" THEN D=2:X=1
270 IF A$="B" THEN D=10:X=0
275 IF A$="G" THEN D=4:X=1
278 IF A$="O" THEN D=0:X=1
280 IF A$="R" THEN D=6:X=0
290 IF A$="L" THEN D=9:X=0
300 REM OUTPUT ROUTINE
310 LET OUT=37136
315 IF X=1 THEN GOTO5000
318 IF X=0 THEN GOTO5500
320 POKE OUT, D
330 REM OUTPUT LATCH NOW SET, NOW READ INPUTS
340 LET IN=37136
345 REM MASK OUTPUT BITS FROM BEING READ
346 REM TIMING LOOP
347 FOR I = 1 TO 100
349 REM READ BITS D4 AND D5 ONLY
350 Y=PEEK (IN) AND 48
370 REM JUMP TO DECISION ROUTINE
380 GOTO 1000
400 REM TIMING LOOP
405 IF I=100 GOTO500
410 NEXT I
500 REM TURN OFF MOTORS
510 POKE OUT, 0
600 GOTO240
1000 REM DECIDE ON COURSE OF ACTION
1010 PRINT Y
1020 IF Y=0 THEN GOTO 400
1025 REM IF Y>0 THEN OBSTACLE DETECTED
1050 GOSUB 2000
1070 IF Y=16 AND X=0 THEN POKE OUT, 9:PRINT "FRNT":GOTO400
1080 IF Y=32 AND X=0 THEN POKE OUT, 5:PRINT "REAR":GOTO400
1090 GOTO400
2000 REM STOP MOTORS
2010 POKE OUT, 0
2015 REM REMOVE RETURN IF FULL STOP DESIRED

```

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Feedback & Control Continued from page 139

is to be operated, the second tri-state buffer must be turned on and the first must be turned off.

To activate the switching, we need another line (9th). The VIC's CB2 is perfect for the job. When the CB2 is turned high, the arm is controllable; when off, the base motors and inputs are active. **Building The Buffer:**

To build the buffer, use the bread boarding procedures given in previous articles in this series. Again, use a board large enough for the sockets and wiring. You can test the unit on your port simulator, and then plug it into the VIC20 computer. Note that the output of the buffer feeds two motor drivers, the Base motor driver, and the arm motor driver. In addition, we are wiring in two limit switch inputs for base

control and allowing two inputs for the light detection and sound detector.

The second buffer allows control of the arm only when the CB2 line is strobed low. This also allows inputting 4 additional lines. These are not connected in the drawing shown, but could be connected in your robot to other sensors. The second program reads these inputs.

Program #1 demonstrates simple control and detection. The way it works is fairly simple. First the computer's DDR (Data Direction Register) is set up to output 4 Bits (D0, D1, D2, & D3) and input 4 Bits (D4, D5, D6, & D7). Then both base motors are operated in the forward direction (i.e. D4 & D2 Poked high). After this is done, the computer simply PEEKs the input lines for the duration of a time loop. When the D4 limit switch (obstacle bumped into in front) is activated, the D4 limit not only sends the signal to the computer but also stops the

motor. This is a backup feature. (The robot itself now has a built-in feature of stopping when an obstacle is detected.) The computer may be busy with other things, and since we are not using computer interrupts, we need the added protection to stop immediately when the obstacle is detected. Note here that the dynamic braking feature in the motor controller is taken advantage of and the robot will stop immediately.

Note on program #1 that the commands are F, B, R, L for forward, back, right, left. This program operates the 1st buffer since CB2 is off (0V) and not strobed. The arm is not used in this case.

Program #2 adds the functions of Up, Down, Grip, and Off (release) for the arm. The additional 4 Data inputs are not used. In this program, if an arm function is selected, the program jumps to a subroutine for strobing the CB2 line prior to outputting on the parallel port. This insures the signal is going to the arm controller. This is a very simple example of multiplying the outputs that can be operated on a parallel bus.

(The controller for the Base and arm were described in previous articles of Computer Shopper, and are simple TTL drivers operating motor driver relays.)

Both programs can be modified extensively for custom use. The timing of 100 on line 347 can be changed for a longer or shorter run. Also, the program can be changed to read the inputs only when a change is made instead of every time the program loops on the timing routine. Note the methods used in the Burglar Alarm program in the last issue of Computer Shopper.

In operation, when an obstacle is detected, the robot turns off, and then is thrown into the reverse direction of where it was going. Then it proceeds in the new direction unless it again strikes an object. You can easily add turning routines in order to allow the robot to learn a route around the obstacle. This is where the personal robot gets to a challenge to our imagination. We can use simple trial and error routines, or we may wish to plug in more exotic routines based on AI principles. You will find that as your program becomes more capable its length will start affecting the amount of time it takes to make a decision. At some time in your program development you may wish to add Machine Coded routines or at least compile your program.

RB Robot Corporation Releases Software Modules For The RB5X(tm) Personal Robot

RB Robot Corporation has released the first four preprogrammed software modules for the RB5X Intelligent Robot(tm). These modules enable RB5X to do specific tasks as soon as the user switches the robot on.

With the introduction of this software, there are now two different ways to operate and use the RB5X: owners can either program the robot themselves using a computer or they can use preprogrammed modules.

The modules are actually memory chips, containing either 2K or 4K bytes of erasable, programmable read-only memory (EPROM), that plug directly into a socket on the back of the RB5X.

Manufactured in Golden, Colorado, RB5X is a fully programmable personal robot for home use and experimentation. RB5X comes completely assembled with Polaroid Rangefinder sonar, tactile sensors that tell the robot when it has encountered an obstacle, its own battery charger, and circuitry and software that enable it to find its charger when its batteries are low. Hardware options -- such as voice/sound synthesis, a robotic arm, and a 16K extended memory board -- are available as add-ons.

Software modules currently available from RB5X dealers include:

- **Pattern Programmer** -- This module allows users to press combinations of the robot's tactile sensors, or bumpers, to instruct RB5X to follow a specified pattern through their homes or businesses. (Suggested retail: \$19.95.)
- **Bumper Music** -- Used in conjunction with a voice/sound synthesis option, this module allows users to play the robot's bumpers like keys on a piano to compose simple tunes that RB5X then plays back. (Suggested retail:

\$14.95.)

- **"Spin-the-Robot"** -- This module contains a game routine that allows children to interact with an RB5X equipped with voice/sound synthesis. (Suggested retail: \$14.95.)
- **Intruder Alarm and "Daisy, Daisy"** -- This one module contains two separate, simple routines for an RB5X equipped with voice/sound synthesis. Intruder Alarm allows the robot to sense movement with its sonar and to sound an alarm. "Daisy, Daisy" enables RB5X to sing the song made famous by HAL in the film "2001: A Space Odyssey." (Suggested retail: \$24.95.)

An arm training software module, which allows users to teach the RB5X's robotic arm to do certain specific movements, is also available and comes with each arm assembly package.

The RB5X itself is delivered with a utility software module that contains a self-diagnostic program. This routine checks the robot's batteries and motor functions as soon as owners unpack the RB5X and switch it on. This module also contains a series of programs -- such as the robot's standard charger-finder routine and Beta with sonar self-learning code -- that may be accessed by pressing combinations of bumpers.

The availability of "off-the-shelf" application software for personal robots should provide a significant boost to the personal robot industry in 1984. RB Robot Corporation plans to introduce many more preprogrammed software modules throughout the year.

For further information, contact Sharon D. Smith, RB Robot Corporation, 18301 West 10th Avenue, Suite 310, Golden, Colorado 80401, (303) 279-5525.

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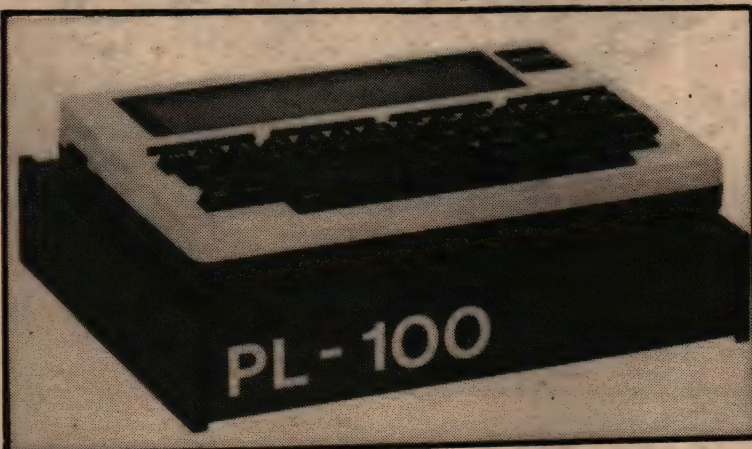
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Datasolvers, Inc. Introduces New Internal, 1200 Baud, Smart Modem For Kaypro Computers

Datasolvers, Inc. of Wichita, Kansas is pleased to announce its internal model expansion for Kaypro computers with the introduction of the DS1200SMT, an internal 300-1200 baud, Hayes com-

patible smart modem.

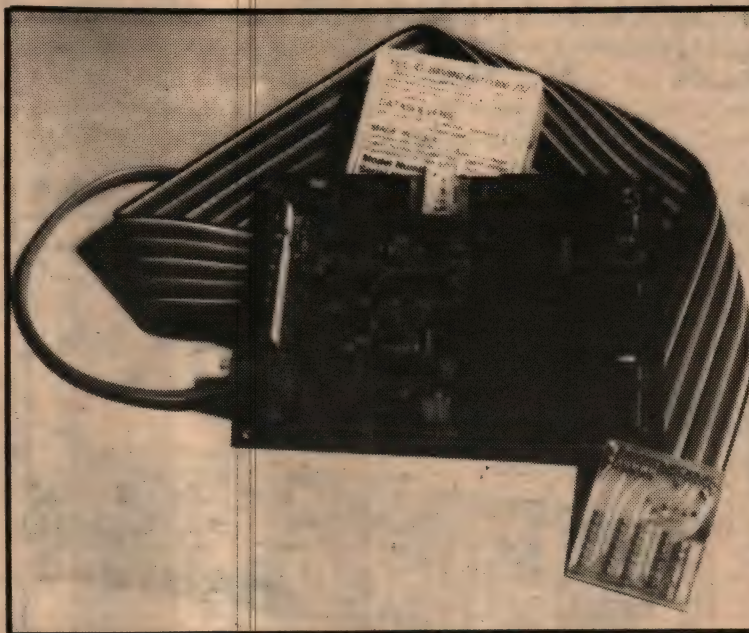
The DS1200SMT is easy to install inside the Kaypro (II, 4 or 10) with no drilling, soldering or computer modification needed; the modem can also be

removed when desired. The DS1200SMT emulates the Hayes 1200 command structure and can be connected to any standard direct-dial modular telephone line (all cables come with the purchase). Its "common-sense" design theory (the idea that a portable computer should remain just that), and its up-to-date technical features make it an important addition to Kaypro peripherals.

The modem comes complete with software, and a 90 day warranty for a retail price of \$427.50. The addition of the DS1200SMT by Datasolvers, Inc. complements its DS300AD, a 300 baud, internal modem for Kaypros which was introduced to the public earlier this fall.

For additional information contact Datasolvers, Inc., 440 Maple, Wichita, KS 67213, (316)264-5068.

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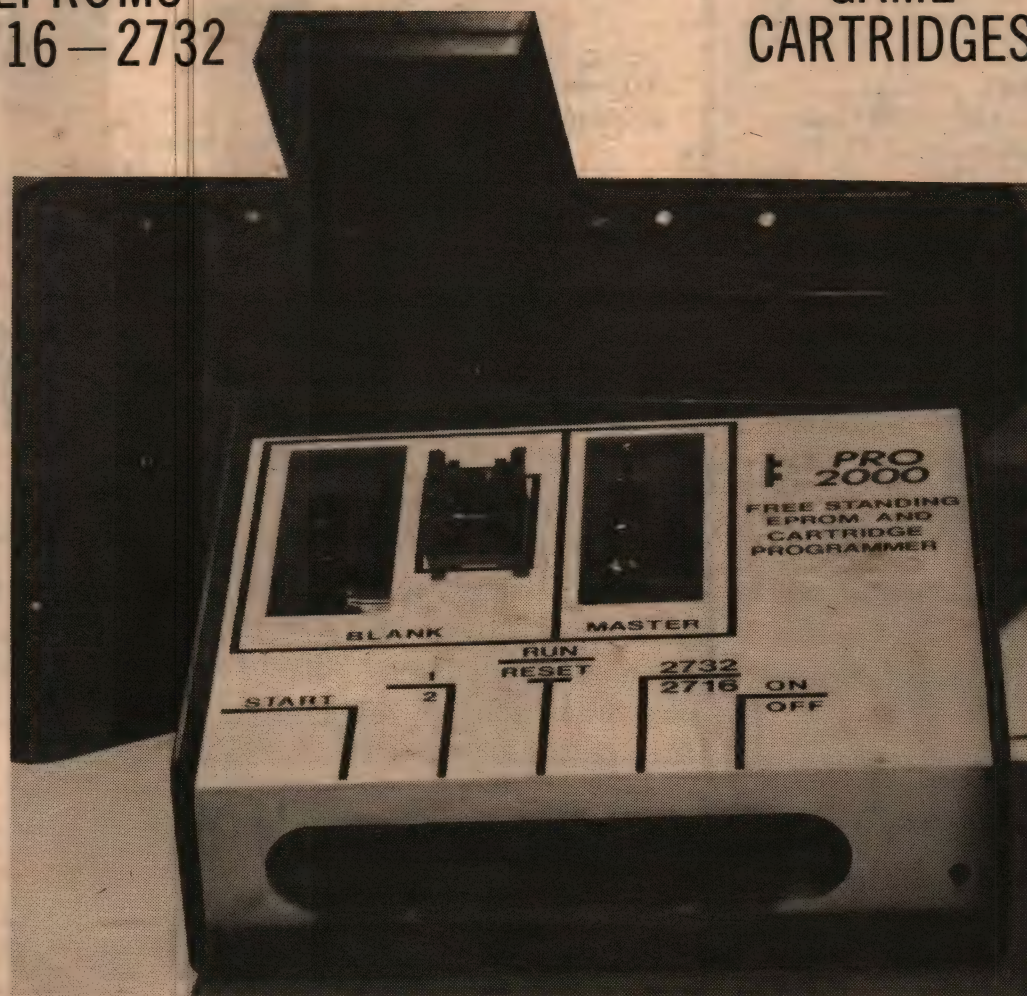
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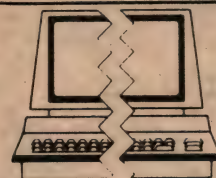
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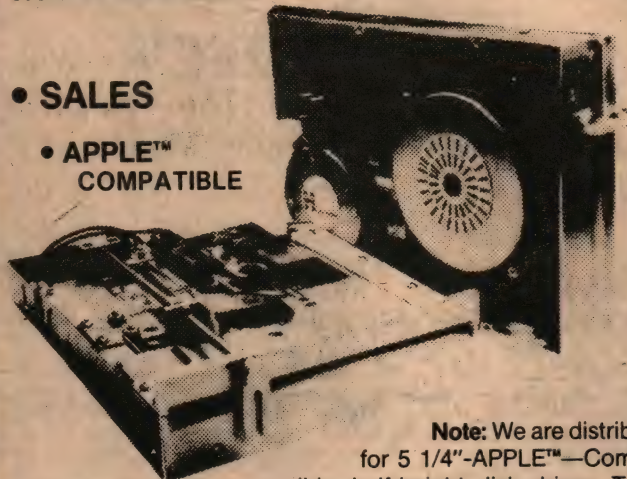
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Darkstar(tm) Computer Program Available For Kaypro II

F/22 Press is pleased to announce that its Darkstar computer program is now available for use with the popular Kaypro II and other CP/M operated computers.

Darkstar is an "Expert" program that solves problems commonly encountered in the photographic darkroom. It works with all black-and-white and color materials to provide exposure data for changes in:

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pensation for black-and-white films to virtually eliminate the need for temperature control. An optional modification enables the program to automatically establish enlarger filter settings and exposure time directly on the Omega D5500 enlarger, through Omega's Auto CLS Contoller, Model II.

Until now Darkstar has been available on disk only for Apple and Atari computers, and on cassette-tape for the Commodore 64 and Timex-Sinclair computers. This latest disk version of Darkstar for the Kaypro II will make the program readily available to a large new group of photographers. The new Kaypro II version of Darkstar requires the use of CP/M BASIC.

Owners of many other computers which operated with CP/M DOS can load and run the Darkstar Kaypro II disk by making use of the Uniform program, available from Micro Solutions.

The price of the Darkstar program disk for the Kaypro II is \$64.95. It is available for immediate delivery, from its publishers, F/22 Press, P.O. Box 141, Leonia, NJ 07605.

Apple and Atari program disks are also priced at \$64.95. The Commodore 64 and Timex-Sinclair cassette-tapes are priced at \$49.95. All versions are immediately available from the publisher. Free literature on Darkstar is also available, upon reader request, from the publisher.

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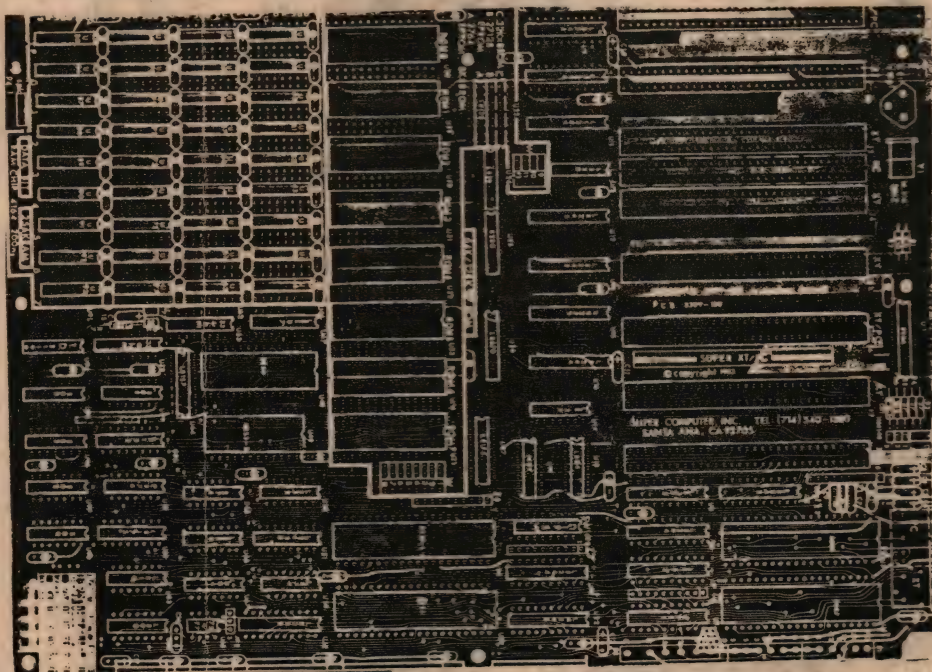
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CP/M SOFTWARE

TurboDOS Now Supports 8086-Family, Z80 Bank-Switching

Software 2000 Inc., has released version 1.3 of its TurboDOS operating system for general distribution. The new release of TurboDOS runs on 8086-family microcomputers as well as Z-80 based machines. It also supports bank-switched memory on Z80 computers, and offers

significantly faster console I/O compared with previous versions. Introduced in April, 1981, TurboDOS was the first microcomputer operating system designed to allow multiple microprocessors to be networked together. Today, it is the most widely-used operating system for multi-processor microcomputers, with over 15,000 installations worldwide.

TurboDOS was originally developed for Z80-based microcomputers, and is compatible with CP/M application packages, languages, and programming tools. The new version also supports 8086-family microprocessors, providing an environment compatible with

CP/M-86. TurboDOS allows 8 and 16 bit processors to be intermixed in a single network. Software 2000 has announced a soon-to-be-released enhancement to 8086 TurboDOS providing compatibility with MS-DOS and PC-DOS.

For Z80 systems, TurboDOS now supports configurations with 128K of banked memory (two banks of 64K each). One bank holds the operating system and a large pool of disk buffers. Almost all of the other banks (except for the topmost 1K) is available for user programs. This 63K transient program area gives applications significantly more space than CP/M, CP/M-Plus, or previous versions of TurboDOS.

Processing of console I/O functions has been speeded up in the new version of TurboDOS, and is now more than twice as fast as before. This results in greatly improved performance with console-intensive applications such as WordStar.

For TurboDOS product information, dealer referrals, or OEM policies, contact Software 2000, Inc., 1127 Hetrick Avenue, Arroyo Grande, CA 93420 or call (805)489-1977.

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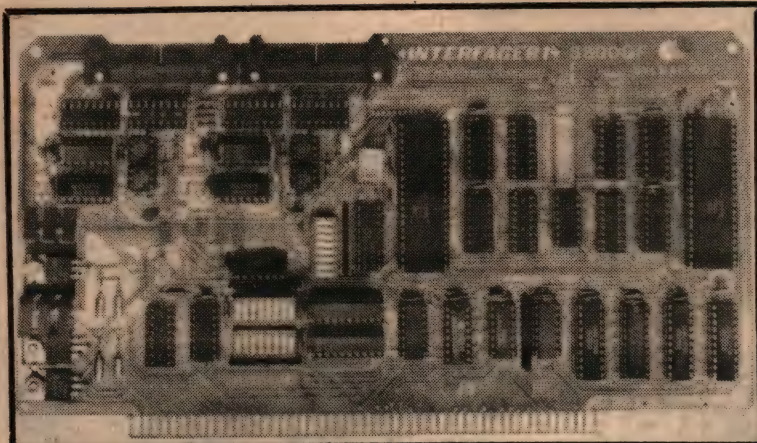
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The Model 8800GF serial interface, from Vector Electronic Company, employs type 1602 universal asynchronous

receiver transmitters (UART) for parallel-to-serial, serial-to-parallel conversion, error detection and serial-data formatting. Character frames can be 7-bits or 8-bits long with odd, even, or no parity and one or two stop bits.

The 8800GF has provisions for adding capacitors on output driver lines to limit slew-rate with very short cable lengths. Holes also are provided for capacitors that improve noise immunity.

Fabricated of epoxy-glass material, the 10.0-inch by 5.3-inch (25.4cm by 13.5cm) circuit board is solder masked on both sides and has gold plated edge connectors for superior contact and long

wear. Power requirements are +8V at 300 mA typical, 500 mA maximum; +16V at 50 mA typical, 150 mA maximum; and, -16V at 50 mA typical, 150 mA maximum.

Available in two versions, the Certified System Component (CSC) Version 8800GFCB has a 200 hour burn-in, two-year limited warranty and direct exchange in case of malfunction. The assembled and tested (A&T) version 8800GFB has a 20 hour burn-in and has a one-year limited warranty.

The board in the CSC Version is priced at \$370.00 each while the Assembled and Tested Version (A&T) board is priced at \$295.00 each. Delivery is stock to 14 days from Vector Electronics Company or at selected distributors and dealers throughout the United States and Canada.

For further information contact Vector Electronic Co., Inc., 12460 Gladstone Ave., Sylmar, CA 91342 or call (213)365-9661 or (213)883-9884.

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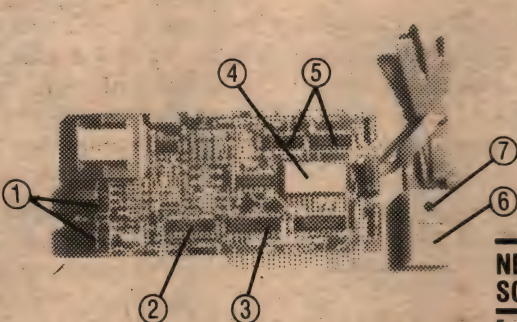
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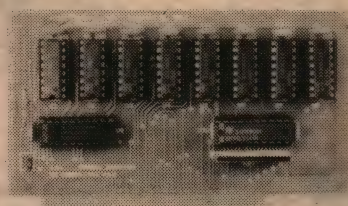
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ePLOT requires an Apple IIe with a Revision B motherboard, the eRAM memory expansion board, disk drive and DOS 3.3. Introductory price for **ePLOT** is just \$29.95.

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Data Cure For CP/M

A software product which solves the problem of unreliable archive and distribution diskettes has been developed by Colorado Online Systems, Incorporated of Ramsey, NJ.

The product, dataCURE(tm), is a utility program for CP/M microcomputer systems. Using proprietary error detection and correction techniques, dataCURE is able to reconstruct the original contents of diskette sectors which have gone bad.

This capability allows dataCURE to rebuild the original file in undamaged replacement sectors. The product can regenerate all the information for a complete track or for sectors damaged by a

multi-track scratch.

Historically, error correction techniques have only been able to fix 10 to 20 bits at a time. DataCURE's ability to regenerate thousands of bits is thus a significant improvement.

Tests by the maker show that dataCURE will rebuild files on diskettes which have had holes punched in them.

According to the maker, similar utility programs could be developed for other classes of storage device such as optical disks, cartridge tapes, hard disks, cassettes, etc.

The maker also believes that application programs would benefit from incorporation of dataCURE into microcomputer operating systems. This could be done either as a run-

time software "addon", or by formally integrating dataCURE with the operating system. (As an interim step in this direction, the existing dataCURE can be called by a running program as an overlay.)

Files protected by dataCURE can contain any kind of programs or data. They continue to be loadable or readable by applications and other utilities.

The protection information is stored in a pair of duplicate files on the protected diskette itself. (Together the protection files take a total of about 5% of diskette space.) Thus extra copies of archive or distribution diskettes are unnecessary.

The product is self-configuring and requires no special user knowledge or training. It uses no special hardware and requires no operating system modifications. It features single-drive operation as well as both a menu mode for "novices" and a command mode for experienced users.

Self-configuring, dataCURE supports sector sizes in the range 128-1024 bytes, both interleaved and non-interleaved. It supports single and double-sided media, both 8" and 5 1/4". The product currently is available for the CP/M 2.2 and Pickles & Trout V2.2E operating systems. A TurboDOS version is in field test.

DataCURE is distributed in 8" SSSD CP/M format. A demonstration version with restricted error correction is priced at \$19. The unrestricted standard product is priced at \$99.

An unrestricted program - called "slave overlay" version is priced at \$149. This version allows developers of application systems to call for the protection of data diskettes after key steps in data reorganization. The calls are made in high level language through an interface subroutine.

For further information contact Colorado Online Systems, Inc., 40 Balfour Lane, Ramsey, NJ 07446, or phone (201)327-5155.

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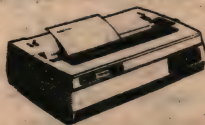
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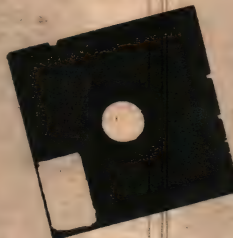
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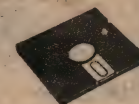
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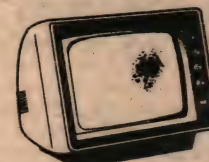
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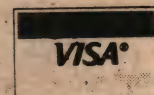
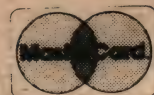
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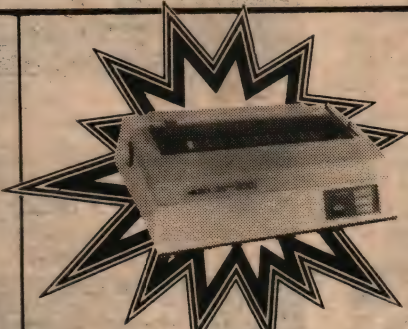
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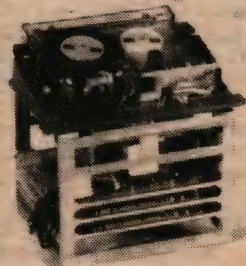


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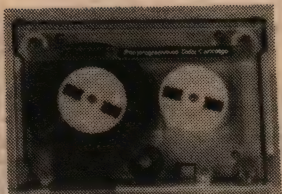
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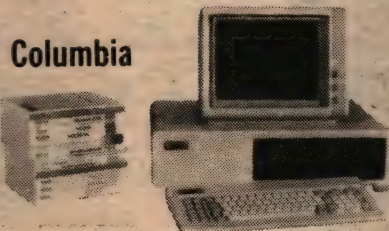
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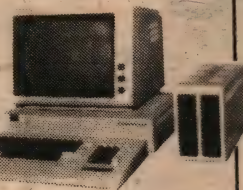


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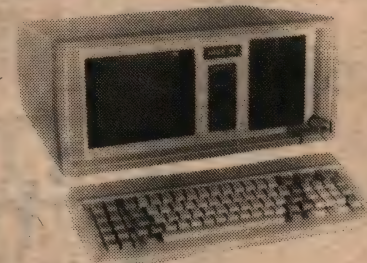


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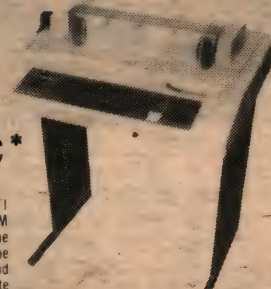
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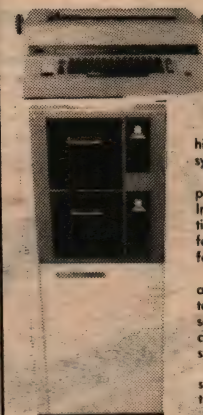
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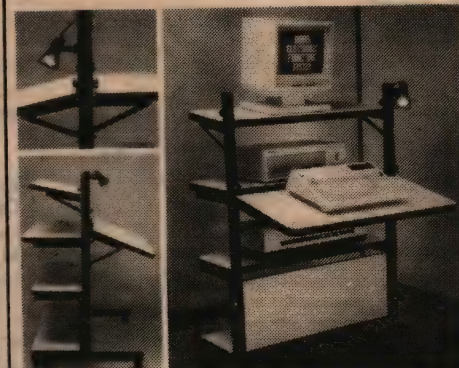
xerox
800

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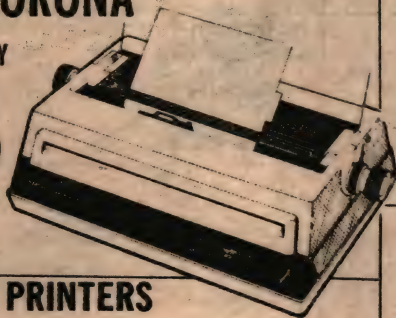
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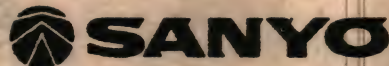
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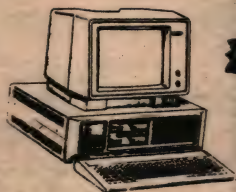
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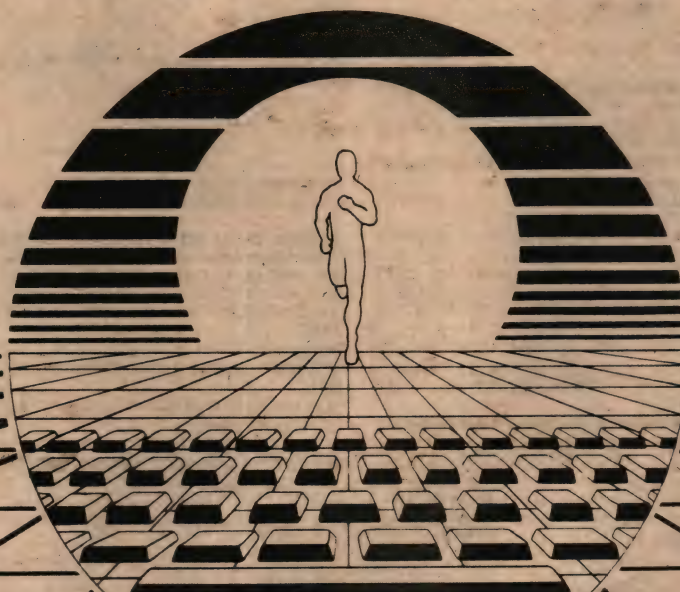
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SPACECOAST MICROCOMPUTER, 315 INLET AVE. MERRITT ISLAND, FL 32952
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SINCLAR END USERS' GROUP, c/o Diana Wright, 2170 OAKBROOK CIRCLE, PALATINE, IL 60067
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MTUPG, PASCAL/MT USERS GROUP, P.O. BOX 192, WEST-MONT, IL 60559
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IOWA
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Users Groups

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KENTUCKY

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JERSEY ATARI COMPUTER GROUP, 58 DEWEY AVE. HIGH BRIDGE, NJ 08829
THE COMPUTER/INVESTOR USERS GROUP, 36 HIGHLAND AVENUE, METUCHEN, NJ 08840
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CENTRAL JERSEY COMPUTER CLUB, c/o RICHARD H. WILLIAMS, RD #1, BOX 147, HOPEWELL, NJ 08525
MONMOUTH COUNTY APPLE USERS GROUP, SEAVIEW SQUARE MALL AUDITORIUM, RT 35 AND RT66, WANAMASSA, NJ
NY METRO LUBE GROUP, 1 MARK RD. KENILWORTH, NJ 07033

TRS-80 USERS GROUP of CHERRY HILL, BRYAN McPHEE- PRESIDENT, 418 VIRGINIA DR., BROWNS MILLS, NJ 08015
AMATEUR COMPUTER GROUP OF NJ, P.O. BOX 319, SOUTH BOUND BROOK, NJ 08880, ATTN: RUSSELL GORR
TRS-80 USERS GROUP OF MONMOUTH COUNTY, 80 BINGHAM AVENUE, RUMSON, NJ 07760
HEATH USERS GROUP OF NJ (HUGNJ), c/o RALPH BRAD- BURN, 300 RT. 59, TALLMAN, NJ 10982
NORTHERN NJ COMPUTER CLUB, c/o HERMAN SACHS, 6 BRYSON RD. FAIRLAWN, NJ 07410
COMPUTER CLUB OF OCEAN COUNTY, 1319 GEORGIAN TERRACE, LAKEWOOD, NJ 08701

Meets on the first Friday of each month at the Tom's River NJ Municipality Bldg.
NORTH JERSEY COMPUTER USERS GROUP, P.O. BOX 382, SPARTA, NJ 07871
COMPUTER CLUB OF OCEAN COUNTY, 400 SURF AVENUE, BEACHWOOD, NJ 08722

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CPM USER GROUP, RT. 1, BOX 244, MILL RD. YAPHANK, NY 11980
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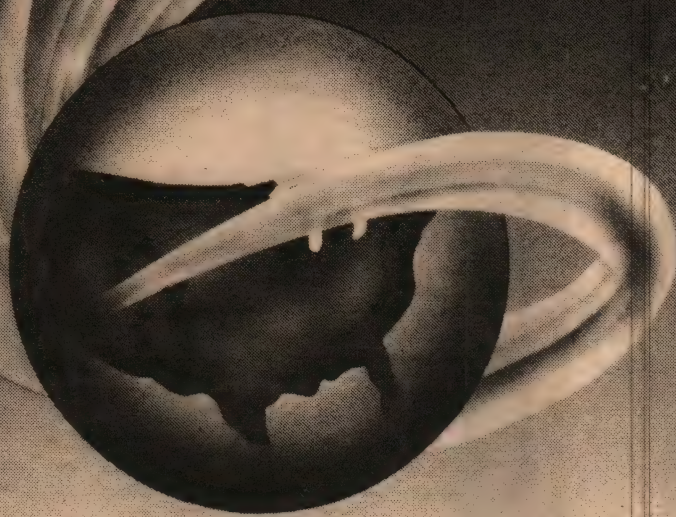
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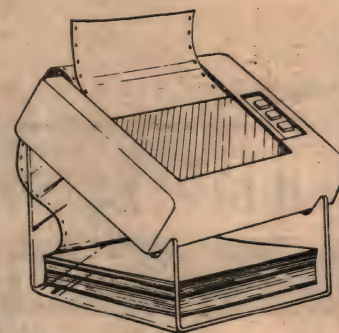
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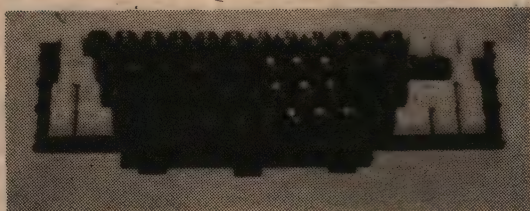
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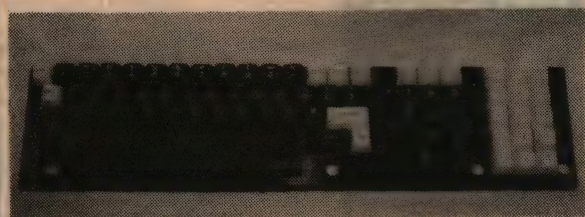
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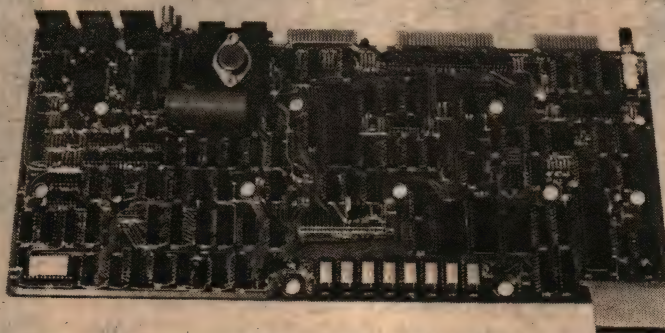
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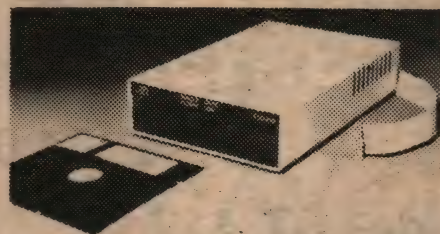
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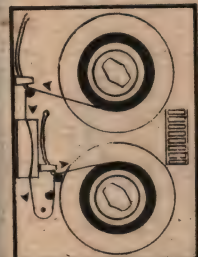
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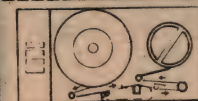
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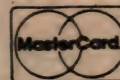
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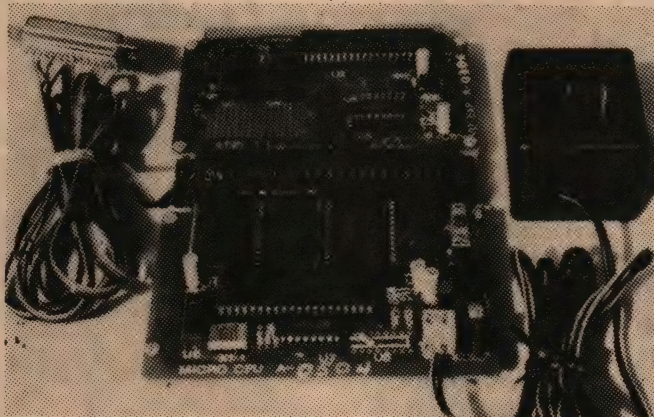
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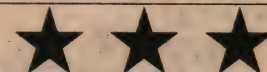
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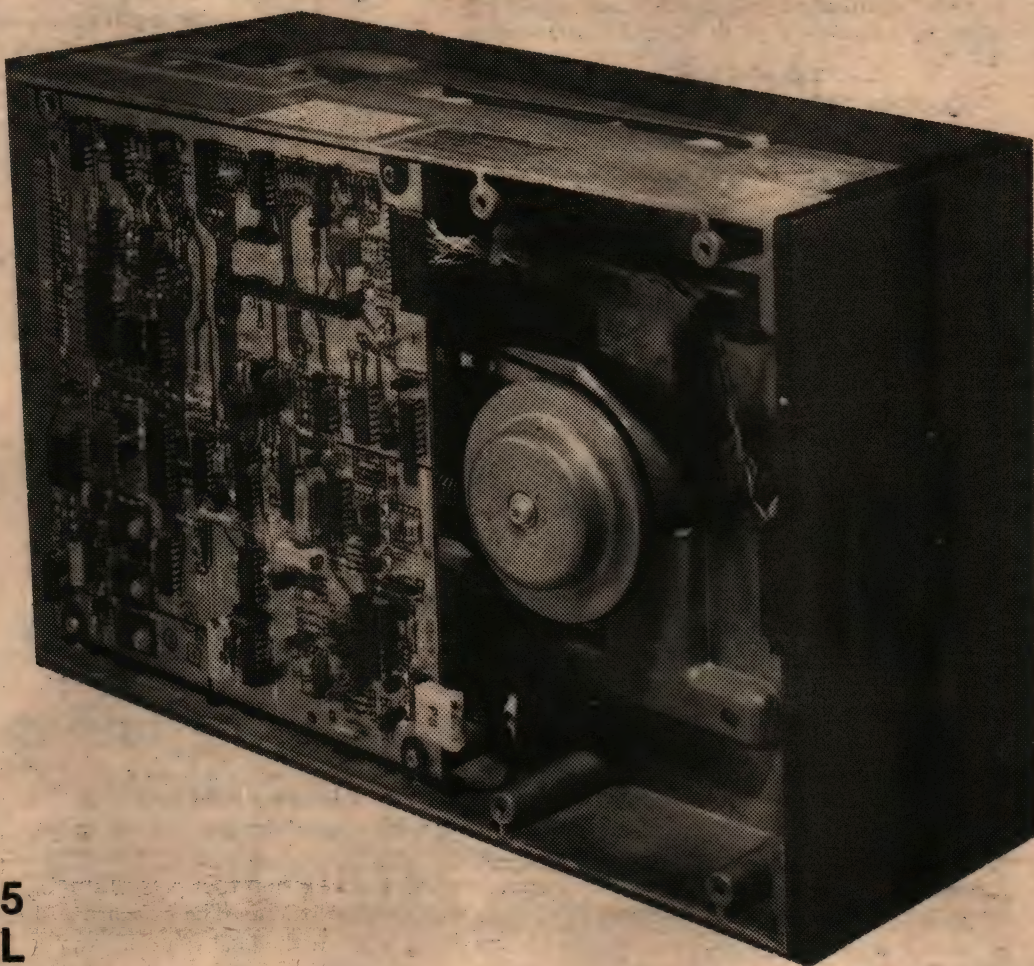
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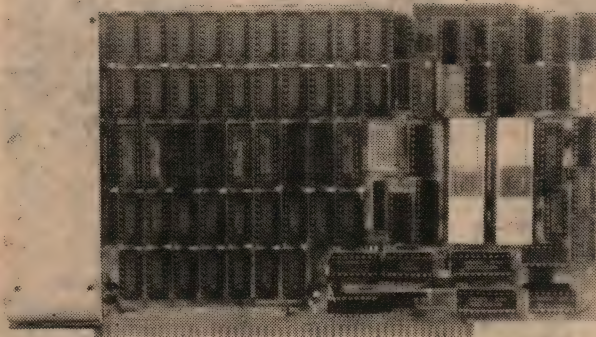
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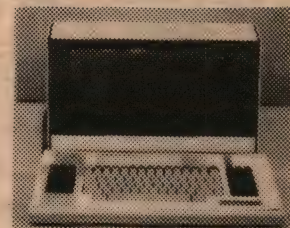
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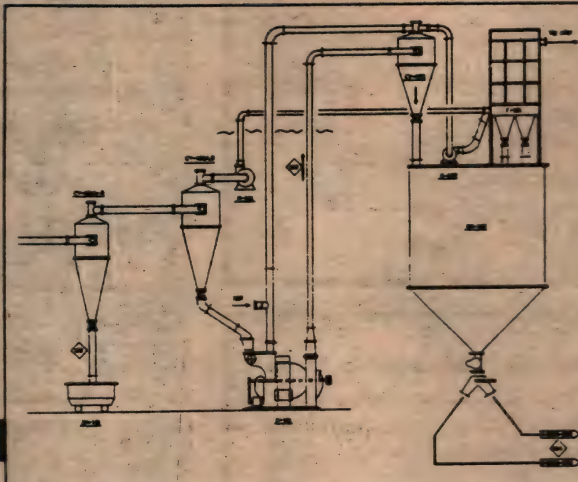
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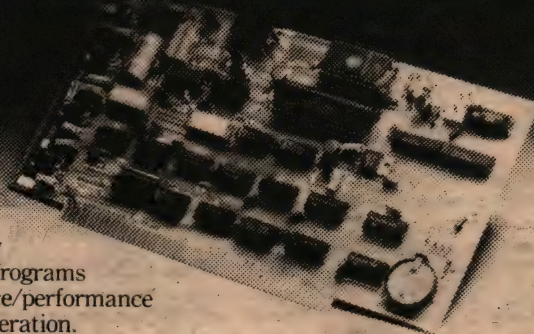
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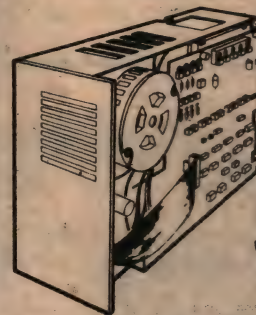
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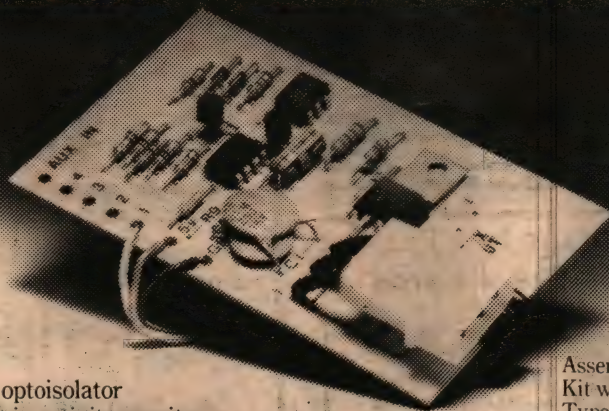
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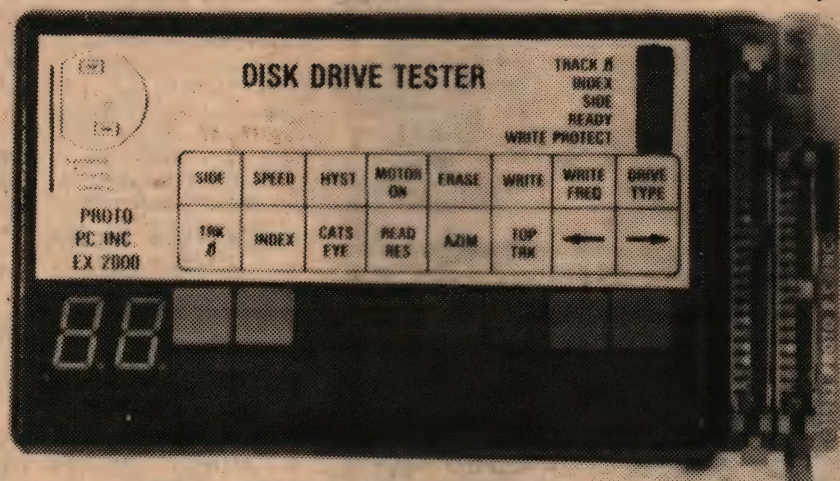


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Hayes Smartmodem/1200	499
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SA850 stepper \$25. Cascade Electronics, Route 1 Box 8, Randolph, MN 55065. 507-645-7997.

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(174) PRINTERS

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*** *****

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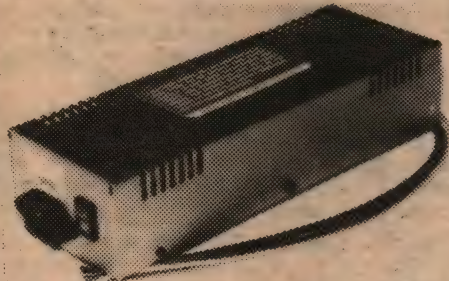
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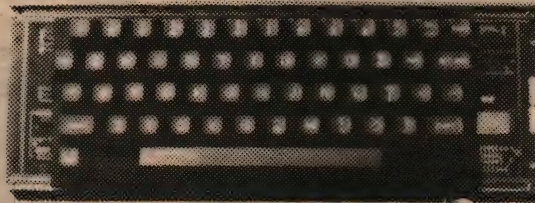
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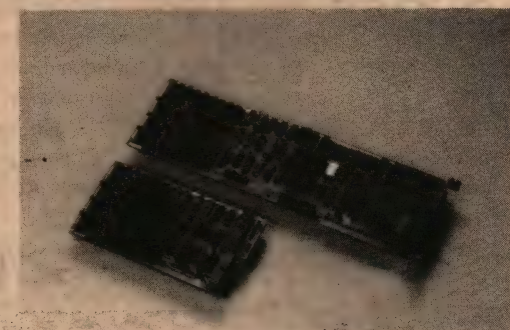
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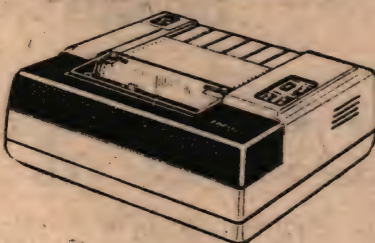
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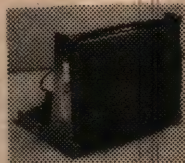
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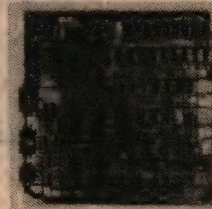
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(182) TERMINALS

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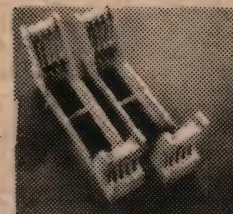
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(183) MULTIBUS BOARDS

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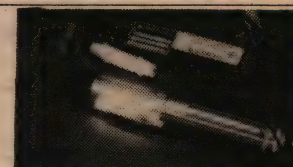
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(188) MISC. EQUIPMENT

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WANTED: USED system components for TI99/4A. Disc drive, joysticks, monitor, etc. Dave Graves, 6114 Wiley St., Hollywood, FL 33023.

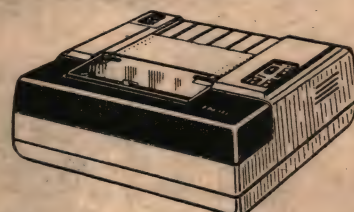
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(188) MISC. EQUIPMENT

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(188) MISC. EQUIPMENT

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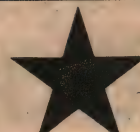
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Directory of Software

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PERSONAL	SOU Sound Prog./Device	PKG Complete Package
• CODE	TEL Telecommunications	PAY Payroll
CAI Computer Aided Instr.	UTL UTILITY/OTHER	TAX Tax Packages
GRA Graphics	CAT EXTENSIVE CATALOG	W/P Word Processing
HOM Home Economics	OTH OTHER PROGRAMS AND SOFTWARE	
PER Personal + Recreation	CUS CUSTOMIZED S/WARE	
	BUSINESS	INDUSTRIAL
PROGRAMMING	• CODE	• CODE
• CODE	ANA Business Analysis	BWL Bowling League Sec.
ASM Assembler	A/P Accounts Payable	CPA Cert. Public Accounting
BAS BASIC Language	A/R Accounts Receivable	DEN Dental
COB Cobol Language	BUS General Bus./Other	ENG Engineering
CST Cassette Program	CAS Cash Register	FIN Financial
DBM Data Base Manager	G/L General Ledger	INS Insurance
EDT Editor	INV Inventory	LAW Legal
FOR FORTRAN Language	JOB Job Costing	MED Medical
FTH Forth Language	MAI Mailing List	PTR Prof. Time Reporter
LNG Other Languages	OMG Osborne/McGraw-Hill Business Pkg.	REA Real Estate
O/S Operating System		SAL Sales Analysis
PAS Pascal Language		STA Statistics
RPT Report Writer		SXC Stock Exchange
	HARDWARE	
mai Mainframes	ata Atari	n/s Northstar
min Minis	com Commodore/PET	o/s Ohio Scientific
mic Micros	hea Heath-Zenith	trs Radio Shack TRS-80
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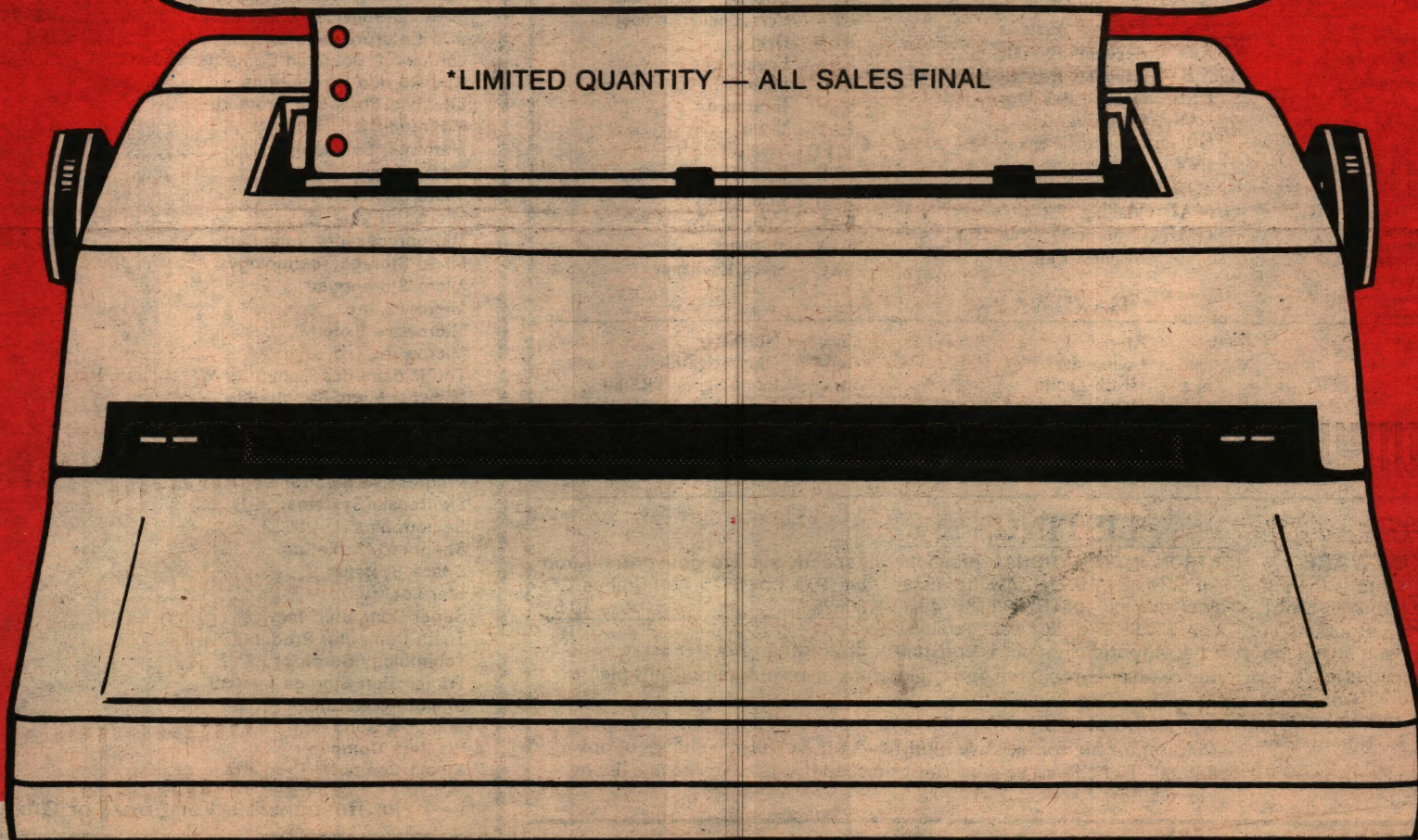
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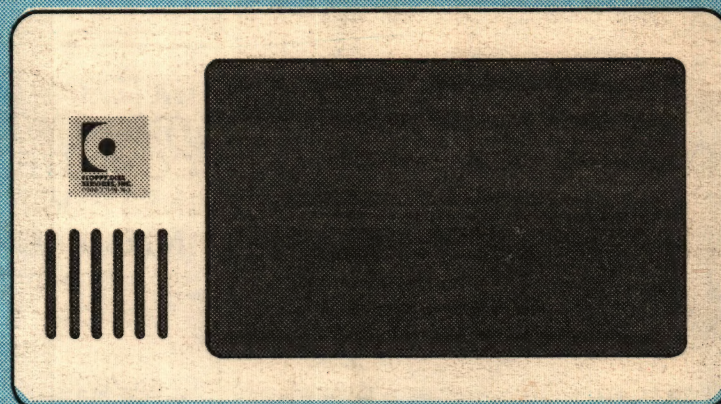
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